FARMERS DIGEST

FEBRUARY, 1946

Volume 9
Number 10

25c a Copy
$2.00 a Year

Lifesaver for Tired Soils	*Farm Journal*	1
Beef Crossbreds Yield Bigger Profits	*Capper's Farmer*	4
Fundamental Trends in Livestock Marketing	*Dakota Farmer*	8
Treated Cotton Will Not Mildew or Rot	*Acco Press*	14
Seed Breeding on the Farm	*Rural New-Yorker*	15
All Set	*Southern Agriculturist*	19
Turkey Efficiency Through Breeding	*Turkey World*	22
A Good Job of Brooding Chicks	*Everybodys Poultry Magazine*	25
Taking the Sweat Out of Farming	*Nation's Business*	28
Bigger Crops at a Profit	*American Agriculturist*	33
The Dairy Service Unit	*Ohio Farmer*	36
Manure . . . Valuable Soil Builder	*Farm Science Reporter*	39
Vegetables in Cellophane	*Pennsylvania Farmer*	45
New Grasses Mean Better Grazing	*Western Farm Life*	47
Aid Livestock Industry	*Shorthorn World*	49
Wisconsin's Co-op Log Yards	*Soil Conservation*	51
Little Farmers Find Big Profit in Cheese	*Southern Planter*	55
What's This Hay Worth?	*Marketing Activities*	57
Ground Roosts Save Time	*Kansas Farmer*	59
Avian Leukosis Complex	*American Poultry Journal*	60
Winter Herd Management	*Hereford Journal*	64
Electric Chick Brooding Studies	*Electricity on the Farm*	67
Factory Methods to Grow Broilers	*Poultry Tribune*	69
Cultivated Blueberry Industry	*American Fruit Grower*	72
Electronics in Food Technology	*Farm Research*	77
Newer Knowledge of Milking	*Herd Builder*	80
How to Cut Feed Costs	*Missouri Ruralist*	82
Faster Gaining Pigs	*Hog Breeder*	83
What Effects Vitamin Content of Crops	*Better Crops*	84
For the Farmer's Library and Index		

The Farmer's Digest

EDITORIAL STAFF:

Editor—L. Bush-Brown Assistant Editor—C. Leavitt Dyer
Business Manager—A. E. Heick
Associate Editors—
John A. Andrew, Jr., James Bush-Brown, Ruth Patrick

ADVISORY EDITORIAL STAFF:

William A. Albrecht
Chairman, Department of Soils
University of Missouri

John D. Beck
Professor of Veterinary Medicine
University of Pennsylvania

Hugh H. Bennett
Chief, U. S. Soil Conservation Service

D. B. Johnstone-Wallace
Assistant Professor, Department of Agronomy
Cornell University

H. J. Reed
Dean of the College of Agriculture
Director of the Experiment Station
Purdue University

W. T. Spanton
Chief, Agricultural Education Service
U. S. Office of Education

Howard B. Sprague
New Jersey Agricultural Experiment Station

M. L. Wilson
Director of Extension Work
United States Department of Agriculture

The Farmers Digest
Published Monthly at Ambler, Pennsylvania
by the Farmer's Digest, Inc.

25c a Copy *1 Year $2.00*
2 Years $3.50 *3 Years $5.00*
Foreign and Canadian Subscriptions $2.50 a Year

Entered as second-class matter at the Post Office at Ambler, Pa., May 6, 1937, under act of March 3, 1879

The Farmer's Digest

Volume 9 February, 1946 Number 10

Lifesaver for Tired Soils

Condensed from Farm Journal

John C. Burtner

If you've ever traveled up and down our eastern or western coastal states or through the South, you've probably been shocked at the sight of acre after acre of old and apparently worn-out and worthless red-hill soil.

"No hope for soil like that," you've said to yourself. "Plant food and organic matter about gone. It's so tired it won't even grow a good crop of weeds."

But don't be too sure about that. There's a lifesaver on the way for these old, exhausted soils. It's in the form of a new crop—a legume which, because of the way it forces its seed underground, is called subterranean clover.

Around a long circle, from North Carolina to Texas to Oregon, it is being hailed as the greatest forage find of a generation, with promise of rebuilding and making profitable many now unproductive farms.

Subterranean clover is a dense-growing, self-feeding pasture, hay, and seed crop. It does well on red soils that are high in acid and low in organic matter. All classes of livestock and poultry like it.

Imported from Australia, it does best in sections with fairly mild winters, starts with the fall rains, grows through the winter, produces good forage all spring, and then dries up and seeds in mid-summer.

Some farmers have reported pasturing subterranean clover for six months out of the year, and then harvesting 200 to 300 pounds of seed. Others who needed hay have obtained as much as four tons an acre.

The seed is borne in little burs close to the ground. Part of it is forced underground, something like a peanut, where it germinates and comes up year after year.

Seed-producing center of the country right now is in Clackamas County, Oregon, where red soil abounds, and where ten

Reprinted by permission from the Farm Journal, Dec., 1945, Philadelphia, Penna.

years ago there were many worn-out farms barely able to pay their way.

The state legislature became sufficiently concerned about the area in 1939 to finance a Red Hill Soils Experiment Station to "develop rehabilitation methods and cropping plans." Among the first crops to be tried at the Station were several strains of a new legume that has been brought in from Australia by a Federal agronomist at Oregon State College. They didn't know exactly what it would do, but decided to give it a test.

When the seed arrived at the Red Hill Station, the land wasn't quite ready, so Ben Elmer, who was farming an ancestral 300-acres of "red soil" in the foothills of the Cascades, remarked that he had a little land in good condition for seeding just then, and would be glad to have them use it.

That was probably about the best offer Elmer will ever make in his life, for today he's the uncrowned king of subterranean clover seed growers in the western hemisphere. His farm is one of the most prosperous of its size in the state. Some of his fields are grossing more than $400 an acre through a double-cropping plan of harvesting a grass seed crop above the clover stand.

As soon as the clover started growing, Elmer knew he had something. It grew and thrived as though it were specially made for non-irrigated, sour soil of low fertility.

He immediately had his local seed company get in touch with Australian growers and got enough seed to plant 6.6 acres the following year. He didn't get it until late, and it wasn't until 1941 that he got his first seed crop, 30 bags of No. 1 and 10 bags of mixed. This year he had 80 acres in seed, yielding 300 pounds an acre on older stands, selling at around 85 cents a pound!

One of the big difficulties has been harvesting the seed. Growers have learned to sow the clover on a smooth seed-bed, and then cut close to the ground with a mower equipped with a lespedeza bar. In this way they can get from 200 to 300 pounds of seed per acre, with about as much left in the ground.

Last year Elmer and some of the other seed growers experimented with a suction-pipe machine developed by the Oregon Experiment Station to pick up filbert nuts. Finding they were able to get an extra 200 pounds of seed an acre with the big "vacuum cleaner," Elmer built one for himself this year.

Some farmers have bought imported subterranean clover seed and been disappointed because they didn't get the right varieties. Only two of the dozens of vari-

eties—Mt. Barker and Tallarook —have been found adapted to this country.

Subterranean clover grows well with other grasses, and is also an excellent weed killer. Its dense growth, especially when seeded with grass such as Chewings or Alta fescue, simply smothers 'em. In type of growth it resembles ladino clover.

With this new crop, dairying is once again moving back into the hills. John Karb, with some poor hill pastures that were all but worthless, scattered subterranean clover seed with no soil preparation, innoculation or fertilizer (all of which are helpful), and has had an abundance of feed ever since.

Buyers at the Portland stockyards were agog last June when a bunch of lambs from the Ried Jagger farm came in, grown and fattened entirely on subterranean clover pasture. They topped the market for the day, a quarter above the best grain-fed lambs. The Jagger lambs, dropped in February, averaged just over 100 pounds, were rolling in fat, and had exceptional fleeces, a factor in the price paid.

Even turkey growers are enthusiastic about the crop. Otto Hoffman used six acres of the clover with Alta fescue as a range for 900 turkey breeding hens. Although the birds literally ate it into the ground, the mixture recovered quickly after they were taken off May 1, and was ready for the young birds later in the summer.

Although Oregon farmers have a head start on the rest of the country because they "discovered" subterranean clover, it is being tested and winning favor elsewhere. The North Carolina Experiment Station has pronounced "sub" clover the best adapted of all legumes tried, for their acid, phosphorus - deficient, red hill soils.

In parts of Texas the legume is popular because of its heavy growth on poor soils, and its ability to smother weeds. Scattered reports from growers in the Atlantic Coast states, the South and border states (those lucky enough to get seed) all have been good.

There is still research work to be done, but it looks now as if farmers in the mild-winter sections have a new forage crop for making abused acres productive that will rival, and perhaps surpass, anything discovered in a generation.

Beef Crossbreds Yield Bigger Profits

Condensed from Capper's Farmer

George A. Montgomery

TOP-NOTCH cattlemen have been wondering the last few years if crossbreeding would not help step up profits for the commercial beef man as it does for the producer of market hogs. Minnesota and Iowa swine tests measured the difference between purebreds and crossbreds. Results bore out the contention of practical hog raisers that efficiency is increased when sows of one breed are mated to boars of another. In the Minnesota tests, crossbred litters were larger, and the pigs possessed extra vigor so that mortality was reduced and faster gains were made. Moreover, crossbreds used feed more efficiently. Crossbred sows had ability to produce larger, healthier, growthier litters than purebred mothers.

Stockmen who have observed results of crossbreeding beef animals believe benefits closely parallel those obtained by crossing 2 breeds of swine. Said one veteran Illinois feeder: "When I find blocky, white-faced roan steers in a bunch of range Herefords I am buying I never accept the seller's offer to cut them out. They don't go off feed and they usually come thru the biggest, best finished individuals in the lot."

Last fall a rancher who wanted his herd to look uniform to feeder buyers, unloaded 7 white-faced black calves at a Nebraska Sandhills sales barn. A group of men who know cattle climbed on the fence to view this offering which had come from a pasture where the fence between the Hereford and Angus herds was not stiff enough to stop a bull.

"Mighty good stuff," said one. "I know both herds; these calves show more quality than either. Somebody should finish a couple of carloads like them to exhibit at the International."

Joseph Pohlen, cattle feeder, who runs an 80-cow beef herd in Sioux County, Iowa, crosses Herefords and Angus. He feeds out the calves and tops the Chicago market with them. He raised Herefords until 1934 when he bought 36 Angus heifers to fatten. Tests showed the Angus free of Bang's and T. B., so he decided to throw them in with his Herefords and breed them. Their blocky, thick-fleshed calves made a better showing than anything

Reprinted by permission from Capper's Farmer, Sept., 1945, Topeka, Kansas

else in his lots and outsold the other cattle when finished. Later he put an Angus bull on his Hereford cows. He says calves of either cross wean larger, gain faster and finish into better beeves than purebreds of either parent breed.

Pohlen's estimate of crossbreds tallies closely with results in a carefully supervised 4-year experiment at the University of Saskatchewan. There 4 breeds—Angus, Hereford, Shorthorn and Galloway—and all possible crosses were tested. This trial started with 40 cows of each breed. They were bred to Angus bulls the first year, and to Herefords, Shorthorns, and Galloways, respectively, the next 3 years. That gave one lot of purebred calves and 3 lots of crossbreds to feed out each year. Calves were finished and slaughtered as baby beeves at about 800 pounds. Weaning weights, feedlot gains, feedlot efficiency, carcass grades and other significant data were recorded. Showing of Galloways and their crosses was relatively poorer than that of the other breeds. For that reason, only Angus, Shorthorns and Herefords and their intercrosses will be compared here. Heaviest lots, in order, were Hereford - Angus, Angus-Shorthorn, Shorthorn-Angus and Hereford-Shorthorn. Of the 4 fastest gaining lots, 3 were crossbreds—Angus-Shorthorn, Hereford-Angus, and Shorthorn-Angus. All outgained Angus, purebred lot that put on pounds fastest. Crosses also had a definite advantage over purebreds in carcass quality.

Crossbreds outgained purebreds in tests at North Dakota station with Angus and Shorthorns.

A few Colorado and California ranchers, to get calves from 2-year-olds, use fine-boned Angus sires and veal the calves so heifers will breed to calve as 3-year-olds. Reuben Albaugh, assistant county agent, and Rudolph Asmus, president of a local cattlemen's association, kept records on 4 Hereford herds in Monterey County, California. One owner, hoping to get smaller calves, bred his yearlings to an Angus bull. The others used Herefords. Only one heifer was lost at calving for 42 Angus-Hereford calves sold. Those who used Hereford bulls lost a heifer for each 15 calves weaned.

The calves were sold for veal at 2½ to 3 months old. Crossbreds averaged 243 pounds and brought $33.70 apiece. Two ranches that used Hereford bulls had comparable figures. Their calves average 199.4 pounds, and sales price was $26.77 a head.

E. K. Crouch, conducting grazing trials for Texas Experiment Station, had purebred Hereford calves and 2 types of crossbreds under his supervision in 1944. The purebreds averaged 369

pounds at 216 days. Calves sired by the same Hereford bull and out of Brahman-Hereford crossbred cows weighed 509 pounds when 3 days younger, an advantage of 140 pounds a calf. Calves from Hereford cows, sired by Brahman-Hereford bull, were 96 pounds lighter at 236 days than those from crossbred mothers, but 44 pounds heavier than straight Herefords. All calves from crossbred cows were fat enough to top local butcher markets. One or 2 from the crossbred bull and none of the straight Herefords were that fat. Some of the extra weight and finish may have been due to superiority of Brahmans as milkers.

The most comprehensive study yet set up in beef crossbreeding is under way at Miles City, Montana. The U. S. Range Livestock Experiment Station there, soon after Dr. L. M. Winters and his Minnesota associates demonstrated superiority of crossbred market hogs, set up a project to test part of the swine-breeding routine on cattle. First step was to mate Hereford cows with purebred Shorthorn bulls. Steer end of the progeny was fed out in performance tests alongside purebred Herefords. Heifers were retained to be mated with Angus bulls. Their triple-cross daughters, in turn, are being bred to Hereford bulls. Thereafter each generation of crossbred heifers will be retained, and Shorthorn, Angus and Hereford bulls will be used on them in the order established by the first 3 crosses.

First lot of Shorthorn-Hereford steers outweighed the Hereford check lot 26.5 pounds apiece at weaning age and outgained them in the feedlot another 25.7 pounds. The second year's crossbreds weaned 14.2 pounds heavier than Herefords, outgained them an additional 70.6 pounds on feed and sold for $9.35 a head more. Crossbreds dressed somewhat higher both years, and cost of their feed was slightly less for each unit of gain.

Performance figures for the first 2 crops of Angus-Shorthorn-Hereford steers indicate crossbred dams are as advantageous in beef making as in pork production. The triple-cross calves outweighed purebred Herefords at weaning 43.9 pounds apiece the first year and 54.7 pounds the second. In the feedlot, they outstripped Herefords an additional 40.5 pounds and 35.4 pounds a calf, respectively, for the 2 years. They were superior in slaughter grade, carcass grade and dressing percentage and sold for 67 cents a hundred more the first year and 55 cents more the second. Greater weight and higher selling price made the first bunch bring $21.22 apiece more than Herefords and the second $19.62 more. They were hearty eaters, however, and

consumed more feed than purebreds during the fattening period. Even so, there was $14.14 more profit a head in the 3-ways crossbreds the first year and $10.40 more the second.

This test and others seem to spotlight a factor of crossbred superiority not pointed out until now. It is this: The crossbred has a better digestive system than a purebred. He can consume more feed without digestive upsets. That is economically important because an animal can make gains only from feed consumed in excess of that needed for body maintenance. A steer that can digest large amounts makes faster gains, reaches market weight and finish in fewer days, and has to be maintained a shorter period of time.

Records of digestive upsets of first-cross calves give some idea of the margin of their superiority. Herefords suffered 40 per cent more from such digestive disorders as bloat, scouring and days off feed the first year of trial and 70 per cent more the second. Similar records were not kept for triple-cross calves but A. L. Baker and Bradford Knapp, Jr., summarizing the work, report they "were easy to keep on feed, finished well, and were relatively free of digestive disturbances."

Hybrid Trees Grow Fast

Hybrid corn has given the term "hybrid" a new meaning in farm language. It means a higher yielding, thriftier, more profitable corn. We have had good mules for a long time. Now we have hybrid chickens and other livestock. The newest hybrids, however, are forest trees. Dr. Ernest J. Schreiner of the U. S. Forest Service has for 20 years been investigating heredity in trees and how to produce faster growing varieties. Some of his "guinea-pig" poplars have grown two or three times as fast as native poplars and the wood of these trees is just as good as others; some better. He is now working on ash, birch, maple, oak and other forest trees.

—*Electricty on the Farm*

Fundamental Trends in Livestock Marketing

Condensed from The Dakota Farmer

O. B. Jesness

Agricultural Economist, University of Minnesota

PRODUCTION on the farm is inseparably linked with marketing operations; consequently, an appropriate starting point is that of noting some production developments. Livestock converts farm feeds into market products. Anything which affects feed production, hence, soon makes its influence apparent in the livestock market.

One of the striking developments of recent years is that of hybrid corn. Ten years ago, the farmer who used hybrid seed was an exception. Today, the farmer in the corn belt who does not use hybrid seed corn is the exception. Acre yields of corn probably have been stepped up about 20 per cent, which in effect adds to the area of the corn belt. Production efficiency has been increased materially and the capacity to produce livestock has been enlarged. Hybrid corn is a clear demonstration of the fact that farming is far from static and that the farmer is awake to new technology.

Mechanization on the farm grows apace. Tractors and tillage and planting equipment are being improved constantly. The findings of research are being increasingly applied to meeting disease and insect pests.

Animal geneticists are using the principles applied by the plant breeder in the development of hybrid corn with some very promising results in the cross breeding of swine. Such developments may play a very important part in adapting livestock to market preferences as well as in adding to production efficiency. Artificial insemination is another technological development which is attracting wide-spread attention among livestock producers.

One problem facing livestock farmers, for which no adequate solution has yet been applied, is that of production and price cycles. We have no assurance today that these cycles will be eliminated. Clearly, this concerns everyone dealing with livestock and meats, from the farmer to the consumer. Variations in feed production, because of weather, are an important factor and any program which lessens fluctuations in feed supply will help. Carry-

Reprinted by permission from The Dakota Farmer, Nov. 17, 1945, Aberdeen, S. D.

over of supplies from favorable seasons to less favorable ones offers some promise. Prudent farmers aim to employ this practice, but it probably can be made more general.

The arguments used to popularize the "ever-normal granary" were in terms of evening out supplies. That program, however, was associated with maintaining certain arbitrary price levels rather than being concerned primarily with physical supply. The consequence was that, until the exceptional demands caused by the war came along, the program was headed in the direction of becoming an "ever-abnormal granary."

If a program is to be effective in reducing variations in supply, it needs to be directed by considerations of physical supply rather than of price. The late Dr. George Warren of Cornell University once epitomized the "ever-normal granary" by saying "easy to fill; hard to empty." That will always be the case as long as it is primarily a price-controlling device. We must be as ready to take supply out as we are to put it in. Nor will the intended purpose be served satisfactorily unless the stocks are largely on the farms or in the producing areas. One real difficulty is that variations in crop yields are not uniform and the costs of transportation and handling limit shipment to equalize supply.

Improved outlook information and its more effective dissemination among farmers can be very helpful in getting farmers to make their plans on the basis of longer-run considerations. This will reduce the violence of the swings in the cycle.

As we turn our attention to matters usually viewed as belonging more directly in the field of marketing, it may be useful to pause long enough to note what marketing involves and what its basic function is. It involves the performance of a wide range of services required in transferring livestock from the farm to the consumer; in transforming the live animal into products suitable for consumption; and in collecting payment from the consumer and distributing it among farmers, processors, and marketing agencies in return for their services. Everyone, having a part in these operations, needs to seek to make his contribution as effective as possible. Improvements in marketing come from rendering better service at the lowest possible cost. That should be the basic objective.

Neither production on the farm nor marketing is static. Both are subject to continual change. This is a desirable state because change is an essential to progress. But change by itself does not necessarily mean progress. Some changes lead to improvement;

others do not. The challenge is to require that we keep our minds open and be willing to make and to adapt ourselves to changes which promise improvement.

One noticeable trend in marketing is the increasing emphasis on grades and standards. While war scarcities have shifted attention from quality to quantity, the expectation is that this situation is only temporary. Adequate grades and standards for livestock and meats are essential if farmers are to determine the value of their products, and consumers are to get the quality they are seeking.

Prices for commodities, as variable in quality as farm products, acquire specific meaning only when linked to effective grades. Grades and price differentials are needed to inform the farmers and handlers of market desires and demands. They provide the incentive for producers to make the extra effort and incur the additional expense frequently associated with the production of higher quality.

Much progress has been made in developing standards for judging the quality of livestock, but surely no one will contend that there is no room for further improvement. Quality differences take on significance only as they are a reflection of characteristsics affecting consumer preferences. In spite of this, the adoption of grade designations with which the consumer may become familiar is a slow process, often encountering resistance.

Another subject which has brought out heated controversy, is that of direct marketing or direct buying. I have no intent or desire to add fuel to that argument. Does not frankness compel us to admit that too often the argument has generated more heat than light because it has been one of defense or attack, rather than one of open-minded, dispassionate analysis? Let us forget about the controversy over "direct marketing." Let us instead pay attention to the services needed to move livestock from the farm through the market and to arrive at the proper valuation of the animals and services. Let us be progressive and seek to adapt methods to the end of obtaining the best results at the lowest cost in the performance of these services.

One aim certainly must be that of moving the stock from the farms to the feed yards and processing plants when and where the livestock of each species and grade are in greatest demand. This should be done with efficiency and dispatch so that the costs may be at a minimum and the quality at a maximum.

Another aim ought to be to improve price making and registering so as to aid the farmer in selecting the best time and place

to sell, and assure him that he is getting his full value for his products.

Does not the problem then become one not of arguing for certain methods but actually developing and adopting those methods which will yield the best results? The long-run gains are likely to go to those who do the best job in performing service for the farmer and the consumer, rather than to the one who does the best job of protecting his particular status.

The number of outlets open to livestock farmers has tended to increase. The problems of making the best selection among those outlets for any given species or grade of livestock is far from simple. The individual farmer finds it difficult to devote the time and attention necessary for the best choice. For that reason it is not unlikely that the future will bring a development of better equipped farmers' marketing organizations to assist members with this part of their marketing problem. These enterprises need to be more than the old-style shipping association formed to assemble and load stock for shipment. They need to have management which keeps in touch with all outlets, knows market values, and can place each particular lot where it will bring the best return.

Standardization and quality are important to consumers but so is price. It is well to keep in mind that meats are a relatively high-priced food and if consumption is to be expanded, economies in handling are important. One way of enlarging meat consumption, and thereby the market for both growers and packers, is that of keeping retail prices within the buying range of the mass market. Attention needs to be given to cutting costs as well as to providing more and better service.

War price controls and subsidy payments have been and are bones of contention. It is easy to chafe under controls and to imagine a state of bliss if they were ended. We tend to magnify the objections and to minimize, if not forget entirely, the purposes for which these controls have been established. It is unrealistic to believe that we could have gone through the war without serious inflation had there been no price control. Inflation would have taken the bit in its teeth and run away, if we had not held firmly the reins of price control. Because we controlled prices, we had to employ rationing to attain some equity in the distribution of inadequate supply. No one argues against the point that full production is the best check on inflation but adequate production of both war and civilian goods is an impossibility in an all-out war. Criticisms of controls ought to be

tempered by realization of the price we would have had to pay, in terms of economic chaos, had there been no controls.

The nation is shifting from war to peacetime pursuits. Unfilled demands for many durable goods such as housing, automobiles, radios, and the like are pressing on the market. The prospects are for a high level of activity for some time ahead. How well we fare after that depends upon how successful we are in organizing and planning our productive efforts and how well we keep the economy in balance.

Farmers increased production about one-third to meet war needs. In spite of this, shortages developed in the civilian market. Lend-lease requirements, which were of considerable importance during the war, are no longer part of the demand picture although we probably shall continue to aid in supplying relief food to war-torn countries for another year or more. Military purchases are tapering off as it no longer is necessary to accumulate stock piles and current needs are going down with demobilization.

It is to be hoped that our own policies and those of other nations will mean the continuation of an active foreign market even though the volume may fall short of that at the height of lend-lease shipments. At the best, there will be some changes in the makeup of that trade. In place of heavy shipments of cheese, dried milk, meat, and some butter, we will return to exporting cotton, tobacco, fruits, lard, and perhaps some wheat. The supply of foods such as cheese, meat, and butter hence will be dependent on domestic outlets.

It seems optimistic to expect civilian demand to continue at extreme war peaks even at a high level of nonagricultural activity. There will be fewer persons receiving regular pay checks. Overtime will largely disappear and the purchasing power it provided will not be maintained even though wage rates rise, unless the output at shorter hours approaches the level of the longer days of wartime. The upgrading of workers under wartime labor shortages is being reversed as supply becomes more ample. Foods also will experience added competition for the consumer's dollar as civilian goods return to the market. Agricultural output, however, is likely to be maintained. In fact, the trend might be upward as more farm labor becomes available, new equipment can be added, and new technology is developed. Farmers consequently are not without basis for the view that consumer demand may not be sufficient to keep lower prices from returning.

True, support prices have been provided by Congress for a two-

year period. These are not without justification as a reconversion aid to the farmer. However, they are not effective instruments for adjusting output or clearing markets and are not well suited for longer-run use. Demand, undoubtedly, will be strong for their continuance if farm prices tend to weaken materially.

What is the probable trend? If we do not weigh carefully the consequences, the likelihood is that price supports will continue. Would this be desirable? Price supports will be most popular among farmers if they are above the market levels. But under such circumstances, we are replacing the market by government action in so far as price determination is concerned. Can government do a better job than the market, especially when it has to rely on a parity formula which expresses outdated relationships in vogue a generation ago?

Prices above the market will encourage expanded production, lessen consumption, reduce exports, and invite the expansion of substitutes. They will call for government control over production and disposal. They will represent a claim on public funds. It will be well if we do our best to appraise carefully, in advance, these angles in order that we may not be saddled with a program that runs contrary to the country's and the farmer's best interest. The trend is likely to be in the nature of drifting unless we do some real serious thinking while we still have a choice.

There is much to be said for allowing the market to seek its level because the resulting prices will do better than artificially-fixed prices in directing farm production, will come closer to moving supplies into consumption, and will favor desirable international trade. At this point some farm leaders will protest that the farmer cannot be left in the lurch in this manner. However, if it becomes necessary to improve the agricultural income situation in times of distress through government action, this may be done by means of income payments. The cry of "subsidy" is heard at once, but what is the maintenance of price at artificially high levels by government action if it too is not subsidy?

The common tendency is to overstress prices and wage rates and to overlook the importance of production and employment. Everyone recognizes that prices and wage rates are important in determining how the national income is distributed. But the size and makeup of that income are determined by production. The interest of all—agriculture, labor, management, capital, the consumer—calls for the highest level of production of goods and services at the greatest attainable ef-

ficiency. A high level of living will not be reached merely by raising prices. It takes production of the required volume and kinds of goods and services, and the maintenance of price relationships which will yield the fairest possible distribution of the results. Each individual has a responsibility for contributing to the sum total as well as having the privilege of drawing upon that total. Wage and price policies need to be arrived at through consideration of their effects upon the common good as well as upon those immediately concerned.

Professions of belief in the benefits of private enterprise are heard on every hand. It may not be out of place to recall that "faith without works is dead." The farmer has demonstrated his belief in full production. He wants the rest of the economy to join in that belief by developing full production of goods and services generally. We will not do so as long as we think only in terms of prices and wage rates. We must think in terms of goods and services and the production and employment they involve.

New Treated Cotton Will Not Mildew or Rot

A new cotton fabric that will not mildew or rot has been developed by scientists of the U. S. Department of Agriculture. The new fabric was buried in the ground for six months with no significant loss of strength.

This new material has the strength and appearance of ordinary cotton, in addition to its ability to resist rot. And the process by which it is made causes no discoloration of the fabric. The treatment is somewhat similar to the acetate process for rayon, but the new cotton fabric has no odor and it does not become sticky. And fortunately the treatment will not cause any harmful effects on foods, so it will make excellent sacks for shipping fruits, vegetables, and other food and feed products.

Specialists of the Texas A. & M. College Extension Service hail the new development as a boon in two general fields which consume large amounts of cotton. First this modified cotton cloth, yarn and sewing thread will make clothing which will not mildew. It can be used for awnings, lawn furniture, and tents which will not rot in damp climates. Fish and tennis nets will profit, too. The new fabric also is expected to be used in making rot-resistant bags.

—Acco Press

Seed Breeding on the Farm

Condensed from The Rural New-Yorker

D. F. Jones

THE production of seed is a specialized business that is restricted, for many crops, to certain areas where the soil and climate are especially suited for the full maturity of well developed seeds. For many vegetables the conditions for seed formation are quite different from those for market production. Lettuce, carrots, and beets, for example, are grown everywhere as a market garden crop, but their seed production is restricted almost entirely to the West Coast and the Rocky Mountain region. Dry, sunny weather is essential for curing seed which will be free from discoloration and which will give strong germination and healthy seedling growth. However, in all parts of the country there are crops that can be grown for seed to advantage, and there are many opportunities in seed production for those who are willing to learn the essential details and to obtain the necessary equipment.

The late Samuel Burnley, a market gardener near Providence, Rhode Island, saw possibilities in the Washington strain of asparagus, when it came out many years ago. He found that this new rust-resistant variety was not only profitable to grow for market, but that the seed crop was even more valuable. Fields were planted to this new variety far enough away from other asparagus to prevent inter-crossing. Seed that is usually wasted was harvested and sold to dealers at good prices for many years. Good asparagus seed and plants from productive, disease free fields are still in demand.

Hybrid corn is, of course, one of the outstanding examples of a specialized seed undertaking that can be developed anywhere that corn is being grown. The method is applicable to field corn, sweet corn and pop corn. Many new hybrids are being released by the State Experiment Stations and the U. S. Department of Agriculture that are well adapted to particular regions. Local farmers who are known in their community can build up a reputation for good seed corn at a fair price. The requirements for producing good seed of hybrid corn are quite exacting, but they can be learned by anyone who is willing to put forth the effort. Not only

Reprinted by permission from The Rural New-Yorker, Nov. 17, 1945, 333 W. 30th St., New York City

must the corn be grown right but it must be harvested, dried, shelled and graded so as to germinate vigorously and produce plants free from seed borne diseases. Soils must be built up to a high level of fertility. Varieties must be selected that reach full maturity, and adequate drying facilities must be available. Here in the East we seldom have a crop failure due to drought, but the corn borer is a serious factor in seed production and damp weather in the Fall sometimes makes proper curing difficult so as to give the quality of seed that is needed. Many growers have learned how to overcome these difficulties by using artificial dryers, and Eastern grown seed is proving to be especially well adapted to this area.

Hybrid seed corn is produced from inbred strains. These inbred plants are small and unproductive, and difficult to keep true to type, but the results obtained from seed that is produced from properly selected inbred strains justify this extra work.

The same principle that is used in the production of hybrid seed corn is now being applied to other crops, notably squash, tomatoes, cucumbers and onions. First generation hybrid summer squash is earlier and more productive than the ordinary naturally pollinated varieties. Like corn, hybrid squash is produced by planting two different inbred lines in alternating rows in the same field. Before the blossoms open, all of the pollen producing flowers of one lot, throughout the field are picked off. Consequently, all of the fruits that form on these emasculated plants must come from the pollen brought to the flowers from the other inbred line. Only these cross-pollinated fruits are saved for seed. The fruits on the pollinator rows are usually sold for produce.

Recently, for the first time in this country, seed of first generation hybrid tomatoes and cucumbers was sold commercially to home and market gardeners. Similar seed was listed in seed catalogs in Germany and Japan about ten years ago. As early as 1916, the Connecticut Agricultural Experiment Station reported its results with first generation hybrid tomatoes and cucumbers. Increases in yield up to 20 per cent and larger size of fruit and earlier maturity were noted in certain crosses. Hybrid cucumber seed can be produced in the field the same as squash. For the present, it is being produced in greenhouses by hand pollination. Hybrid tomato seed must also be produced by hand pollination. Each flower has to be emasculated and the pollen placed on the pistil at the right time, which requires a great deal of hand labor. The cost of the seed is high but

the results are outstanding. The demand for good hybrid vegetable seeds will exceed the supply for a long time to come. Hybrid onion seed is also now being produced for market garden production. The plants are grown in isolated fields and cross-pollination takes place naturally by insects.

Hybrid vigor, which is at the maximum in the first generation, is also carried over into the second generation. This second generation, however, is more variable and usually less desirable, but in some crosses the second generation may be earlier in maturity even than the first. Although not as productive as the first generation, the early maturity may make this seed especially valuable to the market gardener. Second generation hybrid seed is produced from first generation hybrid plants by natural pollination the same as ordinary seed, and it can be produced as cheaply.

Special Varieties

All hybrid seed, being produced from special stocks, can be controlled by the producer. Since this seed cannot be used for further propagation without losing the advantage which hybrid vigor and controlled pollination give, the grower must always come back to the producer for more seed. This gives the originator of any valuable new plant product the same protection as a patent. In fact, it is better than a patent since there is no cost and no danger of infringement. At first sight, this looks like a racket especially favoring the seed grower and dealer. In actual practice, however, it works to the good of all just as the patent law is designed to do. It means that there is an incentive to originate better varieties, and that it is worthwhile for the seed grower to produce this kind of seed. The farmer gets larger and better crops at less cost and the country as a whole gets the increased production on a more efficient basis. Hybrid corn is adding three quarters of a billion dollars to the corn crop each year, and the total crop is being produced on about ten million fewer acres than the former large crops before hybrid corn was available.

New varieties of wheat, oats, barley and soybeans are also now available. Wilt - resistant alfalfa varieties have been produced and this seed will soon be in large demand. Here in the East, alfalfa seeds abundantly on the the poorer soils provided the stands are not too thick. Here we do not have the insects that destroy much of the seed before it can be harvested, as occurs in the West. Much work is also being done with clovers and grass to produce better strains for pasture and meadow. These new varieties offer splendid opportunity for the production of seed. Once the

crossing fields are established with the right strains, hybrid seed can be harvested year after year with no extra cost. This seed will be eagerly sought as soon as its good qualities are known.

The most pressing demand in the East at the present time is for better seed potatoes. The older seed producing sections are having much difficulty in growing seed free from virus and other diseases. Seed potatoes must be grown in a short, cool season where there are few aphis and leaf hoppers. This means that their production is limited to the Northern regions or the higher altitudes farther South. Recently, a new variety has been developed in Maryland from which a second crop can be grown the same year from seed. Early planted tubers are harvested, treated in such a way that they will sprout, and planted immediately; these second crop tubers are small but they are now preferred for seed. Small tubers from healthy plants are more desirable for seed since they do not have to be cut. Whole seed is freer from rots after planting and usually gives better yields. By planting closely, fertilizing heavily and digging at the proper time, heavy yields of this premium seed can be produced in any seed potato section.

Each tuber used must be numbered and a small piece grown during the Winter, either in a greenhouse or in the South so that a pre-season reading can be made as to its freedom from disease. All infected tubers should be discarded before planting in the isolated field in tuber units. Four plants from each healthy tuber are placed in succession; then a skip, and four more plants from another tuber. At harvest time any poor producers can be discarded. This field needs to be also carefully checked during the growing season and any plants with virus symptoms pulled out as soon as noted. The field is carefully sprayed to eliminate aphis and leaf hoppers as far as possible as these spread the disease from plant to plant. New methods of spraying from helicopters with new materials, such as DDT, now promise much better control, thus simplifying the production of disease free seed in the future. Foundation seed as used originally for each variety grown is required for planting the seed producing fields each year.

The production of potatoes for seed involves much more than growing and storing. The most important part is the maintenance of foundation seed free from disease. In actual practice the best seed obtainable is grown in an isolated field as far removed from other potatoes as possible. A clearing in the forest or a small island in a large lake is desirable for this purpose.

While seed production is a highly specialized business, it does offer exceptional returns and interest to plant breeders, farmers and growers. However, unless one intends to study and apply the necessary cultural practices required, it should not be undertaken for its commercial possibilities.

All Set

Condensed from Southern Agriculturist

Charles W. Broyles

Instructor in Vocational Agriculture in Johnson City, Tennessee

JOHNSON COUNTY, Tennessee, farmers have been getting along nicely during recent years with annual incomes of about one million dollars from tobacco, and another million from green beans. Hence, one might expect to find them yielding to that persistent, human tendency to content themselves with the present, while leaving the future to take care of itself. But living on small farms, in a county where only about 57 per cent of the area is in farms and only 12 per cent in harvested cropland, they are quickly affected by economic changes. Having faced these inevitable readjustments before, they realize they will have to meet them again.

In fact, their present leading money crops are the results of comparatively recent changes. Burley tobacco has been grown commercially within the county but little more than 20 years, while in 1919 only three acres of green beans were produced for market. By 1943 bean plantings had increased to 6,000 acres. To the western wheat farmer, working over large areas, this may sound like "small potatoes," but 600,000 bushels of green beans, more than half of which were marketed last year co-operatively through the Tri-State Growers, definitely places Johnson County farmers in the big business class. And it is through their co-operative efforts that they are hoping to make needed adjustments in the years that lie ahead.

The movement dates back to 1926 when a small group of forward-looking farmers, aided by H. L. Miller, then county agent, and R. J. Howard, cashier of the Farmers State Bank, purchased co-operatively two car loads of certified Green Mountain seed

Reprinted by permission from the Southern Agriculturist, Nov., 1945, Nashville, Tenn.

potatoes. For the next few years they produced high quality potatoes, which were carefully graded and sold on surrounding markets for 10 to 15 cents per bag above quoted prices.

"But it was the same old story," says Mr. Howard. "Truckers moved into our territory and began paying 10 to 15 cents more per bushel for a load here and there than we were getting on the market. Without any orderly system of marketing, these truckers would flood one market one day, and another the next. Soon both demand and price had evaporated. Meanwhile, we had built up cabbage as a similar cash crop, and were receiving from $2.00 to $5.00 per ton above market for our quality, standardized product. But we had to contend with exactly the same conditions when marketing our cabbage, and this enterprise likewise was wrecked."

Then the farmers turned to green beans. The character of the soil, the heavy rainfall and the cool nights that start the Mexican bean beetle hunting for cover early in late summer, make Johnson County ideally adapted to the production of this crop. But in 1942, with increasing costs and a 500,000 bushel crop, they found the commission men on the Baltimore and other eastern markets were paying from $3.25 to $3.75 per bushel for beans, for which the growers had received an average of but $1.25 per bushel at the auction markets in Mountain City. According to reports of representatives of the Department of Agriculture and the Agricultural Extension Service, local buyers were netting from $1.00 to $1.75 per bushel—as much, if not more, than the farmers were receiving for growing them.

Naturally the farmers were quick to see the need of better marketing facilities; and the next year, with the aid of the Extension Service, they organized the Tri-State Growers, a non-profit co-operative with a paid-in capital stock of $10,000. Starting with a small membership of 52, the organization now has over 400 members. In 1943, its first year of operation, it sold 217,000 bushels of beans at a cost of five cents per bushel. Then at the end of the year members received rebates which still further reduced their marketing expenses. Although green beans averaged about 35 cents less than the 1942 crop on the eastern terminal markets that year, the average price received by the members was about $1.75. Representatives of the Extension forces estimated that $300,000 extra money went into the pockets of the farmers, from the 1943 crop alone, as a result of this venture in co-operative marketing. Both members and non-members benefitted from the resulting stabilization of prices.

In 1945 Tri-State Growers sold approximately 425,000 bushels of beans for an average of $1.82 per bushel. Experienced bean men estimate this is about 60 to 65 per cent of all beans sold on the open market in Johnson County. However, a constantly diminishing number of growers still sell their beans in the field.

But back to that $64 question of postwar farming adjustments. Johnson County farmers, when eyeing the mushroom growth of their latest enterprise, have always questioned its stability. And the great increase of green bean acreage in the United States from 33,000 acres in 1918 to 331,000 acres in 1943, has strengthened their apprehensions. Endeavoring to meet this situation they first turned their efforts toward whittling down production costs. The Tri-State Growers supply service was organized, through which the members are now securing their seeds, feeds, fertilizers, hampers and similar supplies at cost, plus a small handling charge. This service, which has now been in operation about a year, has paid its way from the very beginning, and is still growing.

Then this spring the Tri-State Growers sponsored the planting of 300 acres of strawberries and 25 acres of raspberries, since they are located in a region where these small fruits are indigenous. But in view of the labor shortage that forced a sharp reduction in this year's bean plantings, this acreage of perishable crops would never have been set had it not been for the development of their improved marketing facilities.

Two community canning plants are now being built within the county, with the aid of the Department of Vocational Agriculture, and already moves are being made toward the establishment of a commercial cannery and a quick-freeze plant in Mountain City. Whether or not these last two efforts materialize is still problematical. But one thing is certain: Johnson County farmers are facing the future with new assurance because of their own united efforts.

Increase Turkey Efficiency Through Breeding

Condensed from Turkey World

Dr. T. C. Byerly

U. S. Department of Agriculture

THE NATIONAL Turkey Improvement Plan provides four breeding stages. These are U.S. Approved, U. S. Certified, U. S. Record of Performance and U. S. Register of Merit. These breeding stages provide effective methods for selection of breeding stock and official recognition of adherence to specified standards of selection by participating breeders.

Turkeys vary widely in weight at market age, body type, rate of growth, fleshing, fertility and hatchability, as well as in color, feather pattern and many other inherited characteristics. Turkey raisers and turkey consumers vary rather less than the turkeys themselves. They vary widely with respect to weight of turkey desired and equally widely with respect to preferred color of feathers. They generally expect to get turkeys with superior conformation and fleshing. The producer must have a uniform, rapidly growing flock. The hatcheryman must have eggs of superior fertility and hatchability if he is to sell poults at a reasonable price and make a profit. Uniformly superior stock can be produced only through the selective matings of superior breeding stock.

The U. S. Approved breeding stage provides for the selection of breeding stock on the basis of physical qualities and varietal characteristics. A skillful, careful flock selecting agent can greatly improve the quality of turkeys produced from a flock by selecting the best birds in the whole flock for use as the next season's breeders before any turkeys are sold for market. Special attention is given to the selection of toms.

The U. S. Certified breeding stage provides for the use of selected females mated to selected fully pedigreed or pen pedigreed toms from the advanced breeding stages. This stage would be the source of outstanding poults in large commercial lots.

The advanced breeding stages of the National Turkey Improvement Plan, U. S. Record of Performance (R. O. P.) and U. S. Register of Merit (R. O. M.), were set up by turkey breeders in recognition of the need for more good pedigreed breeding stock. Participation in these breeding

Reprinted by permission from the Turkey World, Nov., 1945, Mt. Morris, Illinois

stages should be increased to provide pedigreed toms from superior families to head a large proportion of all hatching egg supply flocks.

The turkey industry of this country can reduce the cost of producing poults by at least 25 percent through the development of strains of high egg production, high fertility and high hatchability. Producers can save a month in the time required to grow prime turkeys of any desired weight and body conformation. They can improve greatly body conformation and uniformity of their turkeys. They can accomplish these things by the use of breeding stock of families and strains proved to transmit superior fecundity, early maturity, and uniformly excellent body conformation to their offspring.

The progress made by turkey breeders through physical selection for size and body conformation during the past few years has been remarkable. The hatching-egg flock owner has induced egg production in December or January by artificial illumination instead of waiting for the birds to start in March of their own accord and thus greatly increased the production of hatching eggs per breeder hen.

Adoption of mass production methods by hatching-egg flock owners, hatcherymen and growers has increased the efficiency of production and the volume of product enormously. Nor are exhausted the possibilities for improvement by physical selection. Uniformity and early market finish surely can be improved by early selection of breeding stock. But progress will be faster and the degree of excellence achieved will be greater if more good pedigreed sires are used.

Physical selection is limited in value by two very important factors. First, only those characters expressed in the adult bird itself are used as a basis for selection. Weight, conformation, feathering and fattening can be judged. Egg production, fertility and hatchability cannot. Second, the efficiency of physical selection for those characters which can be judged is greatly limited by the fact that turkeys only breed true for a minor proportion of the characters which they themselves possess. Many undesirable characters remain hidden through generation after generation of physically selected breeding stock, appearing in the offspring to destroy the uniformity of the flock and to reduce profit to its grower.

Many breeders carefully select a flock of breeding birds which meets all the requirements for the Broad Breasted classification. The following season they and their customers discover that those fine Broad Breasted breeders were carrying hidden factors

for slab sided carcass which show up in their offspring. The only way to get rid of such undesirable hidden characters is through pedigree breeding. In the case of characters affecting body conformation, fleshing and other market qualities, effective pedigree breeding must include progeny testing.

As long as turkey hens have an egg production of 50 eggs each, turkey hatching eggs will remain high in price. When production during the breeding season is increased to 100 eggs per hen, price will be reduced with greater profit opportunities to hatching egg producer, hatcheryman and flock owner. The breeder can measure egg production roughly by using special bands on early maturing birds and another band for each broody period. He can do a much more thorough job by using trapnests. Rate of production during laying periods can be measured only through its use. Broodiness can be greatly reduced, perhaps finally eliminated, by selecting non-broody females as breeders.

The Record of Performance and Register of Merit breeding stages of the Turkey Improvement Plan provide two basic procedures for improvement through pedigree breeding. R.O.P. includes the use of the trapnest to measure egg production and of pedigree hatching to measure fertility and hatchability of eggs from physically selected breeding turkeys. Many R.O.P breeders progeny test their stock for body conformation and market quality though they are not required to do so. R.O.M. is based on the progeny test. It provides for the measurement of the breeding worth of the mating by the performance of its offspring. R.O.M. breeders may use pen pedigreed stock which provides a progeny test of the sires breeding value or individually pedigreed stock which provides a progeny test of both sire and dam.

The Record of Performance breeder is able to supply pedigreed hatching eggs and breeding stock from selected matings of known superior egg production, fertility and hatchability. Individual birds in R.O.P. matings are selected to a high standard of physical excellence and are good representatives of the variety.

The R.O.M. breeder who uses the pen pedigree method can provide hatching eggs from pens of known high fertility. His breeding stock is selected from families proved by progeny test to transmit superior body conformation, market quality and other desirable characters. The R. O. M. breeder who uses individually pedigreed stock from trapnested breeding stock combines all the excellent practices of the R.O.P. breeder with the progeny test method upon which the Register of Merit breeding stage is based.

How To Do a Good Job of Brooding Chicks

Condensed from Everybodys Poultry Magazine

Robert Nichols

FUNDAMENTALS in raising chicks have changed but very little. Poultrymen brood with coal, oil, gas, electricity, hot water, and wood and, regardless of kind of heat, seem to get the job done. Coal brooders continue to hold their popularity, but gas is definitely on the increase in the New England states. Hot water systems are increasing in use on commercial farms, perhaps largely because of their labor saving and fuel saving features.

Brooding of replacement stock and broilers is entirely different in respect to the number per stove. Everywhere size of broods of replacement chicks is being limited to 250 or 300 chicks to a brooder, almost regardless of the house size. This seems to be one of the very important considerations, for crowding gives poorer chicks in every respect.

Brooding of broiler chicks is likely to be more practical at a 400 rate to the stove. In broiler raising, there is a limit in labor efficiency under which it is not practical to go. Even though slightly better birds might be raised in smaller broods, it is not very profitable to go under the 400 rate in commercial production.

Coccidiosis control remains one of the most important of brooding problems. Little progress has been made in the prevention of this disease under commercial conditions. Most broods of chickens have it to some extent, especially on commercial broiler farms where very few broods escape.

If there is an effective preventive, it is dryness — dryness of litter, dryness around the drinking fountains, and dryness outside the houses. When we have these conditions, pathologists at state colleges report but few cases coming in for diagnosis.

To keep down coccidiosis, hold down number of chicks in a brood, keep a deep dry litter on the floor, and use a screen under the waterer. If it comes, or if conditions favor it, then flushing with a milk carrying mash or some medicinal treatment is called for.

The brooder house litter is an important item. It's important from the standpoint of what kind to use, how much, when to change it, and how to keep chicks from eating it. Peat moss, shavings,

Reprinted by permission from Everybodys Poultry Magazine, Mar., 1945, Hanover, Pa.

oat hulls, shredded sugar cane, cottonseed hulls, peanut hulls, and minerals are among the litter materials being used for chicks.

Seldom is it safe to brood chicks without a circle or enclosure around the brooder stove. Corrugated paper made especially for the purpose is the first choice. Coming in a large roll the circle can be expanded as the chicks grow. The circle is almost a necessity in maintaining a comfortable temperature for chicks.

The litter is likely to be eaten by chicks and there is hardly a kind that escapes. But the danger comes during the first three days, and it is good judgement to cover the litter until the chicks learn to eat. That isn't very long, and here is a covering program that works well. At the start have the litter covered with two thicknesses of newspaper. At the end of the first day, add another single layer, leaving the previous layer on the floor and remove it all at the end of the second day.

Feeding can be on the paper, egg flats or paper plates for two days. By that time chicks have learned to eat and there is little danger of litter eating.

While there are many feeding methods, the one that starts chicks on grain has much in its favor. It practically eliminates the pasting up that comes when temperature or management methods are not right. Chicks can be fed the chick-size grain five times daily along with all of the grit they want. They will not grow as fast on grain as on mash, but they will overcome the slight handicap by six weeks. The change from the grain to mash can be made abruptly on the third day. The two days of feeding seem sufficient to prevent most of the pasting up and this is not so much of a handicap in retarded growth.

Just how much litter to use and when to add new is hard to estimate. It varies with the kind. It seems evident that control of coccidiosis is easier when a considerable amount is used and when it is turned or stirred often. It should not crust over or cake on top, and it might well range from 4 to 5 inches in depth. Unless there is trouble from coccidiosis or some other disease, it is best not to change the litter during the entire brooding period.

Roosts are losing favor very rapidly. They are not desirable for heavy breeds during the first 12 weeks. Roosts cause breast deformities including both crooked keels and knobs on the breasts. No roosts are not a handicap in later roosting because low pits are commonly used in laying houses and birds take to them easily even if they have never roosted.

Feeding chicks on mash alone for the first eight weeks, except for the starting period, is a popular method. Grain feeding usually starts at eight weeks and continues through the growing period. Oats are particularly valuable, giving good bone growth, excellent feathers and good body growth. Grains that birds are to have as layers should be fed during the growing season. This is particularly true of whole corn.

There is practically no increase in confinement rearing of chicks, except that in permanent brooder houses chicks are raised to about eight weeks in houses and are then moved to range shelters. It is not worth while to try to get chicks on sunporches or sand runs during the first eight weeks. If their rations carry ample vitamins, which is usually the case with commercial feeds, confinement rearing for eight weeks is very satisfactory.

A somewhat surprising observation was made recently at one of the agricultural colleges. Injury in the form of watery blisters was found in chicks and it was thought to be due to burning with the disinfectant. The condition was reproduced when chicks came in contact with newly applied mite paints, particularly in cold weather. This led to the recommendation that the paint be applied at least 30 days before chicks are brooded if they are started in cold weather.

Feed for Wintering

A host of ailments in livestock met on many farms often are traceable to poor hay fed during winter, the absence of winter grazing crops, and to poor management generally. The usual run of farm roughages available for cattle on the average farm does not carry enough of the protective vitamins and proteins for either young animals or breeding animals. Each livestock owner should attempt to provide at least a minimum of good quality hay or green winter grazing for all young animals and for the mature breeding animals if reasonable growth and production are expected.

—*Shorthorn World*

Taking the Sweat Out of Farming

Condensed from Nation's Business

Junius B. Wood

WAVES of the pent-up flood of farm machinery—held back by four years of war restrictions and military demands—are now reaching the farms. The big implement plants of the Middle West have recovered and are running full blast.

It is estimated that in the coming year America's farmers will spend $1,000,000,000 for new equipment. Annual totals are expected to exceed that in successive years.

Though farm machinery was curtailed by allocations and priorities during the war, experimental and development work continued. Following the trend which began before the war, the new machines center about the tractor, are lightweight, compact, adaptable—and, what is more important, are designed for one-man operation.

The old-time thresher outfit, for example, with all its clatter of a small-town circus, is out. One man can now do the whole threshing job by himself (minus most of the noise) with a small combine which mows, threshes and loads any grain crop—including a wet field of rice—in a single operation. This combine may be either self-propelled or pulled and powered by a tractor.

For corn, a mechanical picker—with one man doing the work of eight to 12—strips the stalks, husks the ears, blows them clean and loads them into a trailer hitched on behind.

The old back-breaking job of beet picking, for which entire Mexican families used to be in great seasonal demand, is now done by a one-man harvester whose steel fingers resting on a beet top show mechanical knives where to cut off the leaves, while discs break the soil and stronger steel fingers pick out the beets. Beets and tops are deposited in separate wind-rows.

Possibly cultivation of the soil was started by a man swinging a crude hoe, a one-man tool. Fighting for better harvests and less toil, men developed other hand tools through the ages, increasing their size and utility until the power of horses, mules and oxen was needed to pull them. The gasoline motor brought the tractor with greater horsepower, operating larger machines and cultivating more acres.

Reprinted by permission from the Nation's Business, Nov., 1945, Washington, D. C.

The first objective of the tractor was to exceed the strength of four-legged power, even of a 50-horse tractor hitch. This was accomplished by a tractor whose wheels revolved, and still do, in an endless chain of steel plates which are stationary on the ground, hence the name "track-laying or crawler type tractors."

Vying with this was the tractor on wheels with steel lugs, or teeth. They pulled in almost any soil but road commissioners howled and posted warning signs. The farmer was obliged to remove a dozen lugs from each wheel if he used a public highway between home and field.

Then came the rubber-tired tractor with the same big driving wheels, claimed to be easier to navigate, to move faster (15 to 20 m.p.h. is customary on the road), have better traction, use less power for its weight and be easier on the soil. Wheels of much auxiliary equipment are standard sizes to use worn automobile tires.

While taming the tractor, company engineers also designed new burdens for its back. A tractor is now the farmer's mobile power plant. In addition to pulling, it has a power take-off to operate other equipment which moves with it in a field, a pulley wheel for belt machinery when it is stationary, a front hoist, an hydraulic lift and even an electric starter and air pump.

The need to add equipment to a tractor challenged inventive genius. A day seldom passes in which an implement firm does not receive a letter from a farmer or inventor suggesting a new device, often with a drawing showing how it should work. In the years, company engineers have perfected thousands of attachments and auxiliary machines. Almost every crop has variations, and differences in soil and climate must be considered.

Catalogs of big implement houses are fat volumes. Their machines differ as much as the farmers whose needs they supply but all have the same purpose—better, easier and more economical farming. A new work saver never is long on the market before other makes are competing.

In general, equipment which is pulled can be hitched to any make of tractor. The same naturally is true of stationary belt-driven machines. Many which move with the tractor and take their power from its power take-off also are interchangeable but, in most cases, so-called attachments must come from the same factory as the tractor. Safety guards are a universal feature as farm accidents once outnumbered those in industry by three to one.

More farmers are interested in hay than in any other crop. Horses are disappearing from farms but cattle and other "hay

burners" are increasing. In tonnage, the country's hay crop equals wheat and corn combined. It also is the meanest to handle.

Emphasis is now placed on quality hay—vitamins for livestock — conserving its carotene, digestible protein, calcium and phosphorus. A crusher to crack the hard stems, especially of alfalfa, can be attached to the mower so the hay will dry uniformly before the blades or leaves bleach or become dry and brittle and lose their strength.

Drying systems which blow warm air into the haymow can be installed in barns but most farmers still depend on the sun. The 70 to 75 per cent of water in freshly cut hay must be dried to 20 to 25 per cent to avoid spontaneous combustion. Consequently the farmer has both curing and drying in mind when fixing his day's stint of mowing.

Two new styles in hay-do are the round and sliced bale. The round bale is rolled like carpet and automatically tied with twine. It can be unrolled in front of the feeding stalls. The sliced bale has the well known shape and is wire bound but is baled in slices, a cut loaf of hay. Three to five tons of baled hay can be stored in the space required for one ton of loose hay and without being touched by a pitchfork from field to mow.

If the farmer prefers chopped hay he can link a forage pick-up harvester to his tractor, follow the windrows, chopping some ten tons an hour into lengths from three-eighths to three inches as he moves along. The harvester also loads it into a trailer hitched behind and a blower lifts it into the mow, all a one-man job.

Changes and improvements in farm machinery have come fast in the past 20 years. No crop is overlooked and they run into hundreds. A plow still is a plow but the tractor-attached plows of today, whether one or a battery of five, are much different from the first steel plow of a bygone century.

What is called a corn and cotton planter can be equipped with different sized drills to plant anything from tomato seeds to horse beans—34 varieties of corn alone —and adjusted to count out two, three or four kernels to a hill.

Nor has mechanization stopped with field machinery. The Department of Agriculture says 60 per cent of farm income comes from livestock, close to 24 per cent from dairying which is largely an indoor occupation.

Ohio State University compared two farms. On one of them, the farmer walked 170 miles in a month to feed and care for his livestock — about 42 hours of hoofing. On the other with the same number of animals but with an equipped barn, steel stalls, and

stanchions, feeding and watering machinery and other modern barn items, the farmer walked only 33 miles.

On some farms, hand milking is becoming a lost art. A bang-up milker needs five hours to milk 20 cows, twice a day, by hand. With a machine, he can do it in one hour and 20 minutes with less annoyance to the cows. The first patent on a milking machine was granted to a woman in 1878. It was a four-hole suction basin to hook up with a hand pump.

The first patent on a popular milking machine was issued 50 years ago but 24 more years of experimentation and improvement were needed before it was on the market and more changes have followed. It is economical for as few as eight cows.

Whether or not one-man farm machinery revolutionizes agriculture, it should at least increase national production. It will not replace heavier machines on big farms though it may supplement them on many. Its place is on millions of small farms.

The widest use of power equipment operated by one man will be by millions of practical farmers who toil from sun-up to sunset to support their families on small farms. The Bureau of Census enumerates 5,713,000 farms with crop land in the United States. By unofficial estimate, only one-seventh of these use hired help. The official breakdown continues into 3,331,000 farms, or 58 per cent, with less than 40 crop acres, each with an annual average gross income of less than $1,500; 2,200,000, or 38½ per cent with an income of more than $400; and 1,130,000, or close to 20 per cent, earning less than $400 in a year.

The social argument is that one-man machinery will reduce the farmer's hours of daily toil. The substantial economic argument—surprisingly, the price of a new design all-purpose small tractor is less than for the smallest previous model—is that it will reduce cost of production, increase crop yield by more acres cultivated through improved methods and conserve the soil for future years. In short, the machine puts the one-man or family farm on a competitive basis with the big farm.

Those who want to harness nature can have machinery for the smallest garden or largest farm. The Bureau of Census lists 1,156 manufacturers of farm equipment and the War Production Board runs the number to 1,600. A few are giant corporations, called "full line" producers; hundreds specialize in particular machines or attachments and many of the 1,600 are one to five-man workshops. Four companies produce track type tractors, 16 turn out wheel type, and 14 garden sizes

where the pilot rides or walks. Several produce all types, one company offering more than 20 models and sizes of wheel tractors alone.

By turning to the production of one-man farm equipment, the farm machinery manufacturers are gaining wide new markets (without losing their old) in much the same way in which the automobile industry expanded when it turned to the production of lower-priced cars along with more expensive units.

In 1830, 83 per cent of the workers in the United States were in agriculture. In 1930, the figure was slightly more than 21 per cent. In 1830, 60 man-hours were required to produce a 20-bushel acre of wheat—from plowing to storing in the barn. In 1930, one man could do it with machinery in 3.3 hours. The same comparison for a 40-bushel acre of corn, is 35 man-hours and one man working six hours.

In 1944, fewer people were working on the farms of the United States than at any time in the previous 20 years and a larger proportion of them were old men, women and children. In spite of that, they produced enough food to feed our own people and to feed millions in other countries. We did not get everything we wanted but we had no serious food shortage. Machines and intelligent farming did the job.

Penicillin for Mastitis

Research is under way at various institutions with the use of the new drug, penicillin, for the cure of mastitis in dairy cows. The results reported have been promising.

The University of Illinois has reported that of 44 infected quarters treated, approximately 60 per cent were cured after one treatment; seven quarters required two treatments and three quarters required three treatments. Only seven infected quarters (about 15 per cent) remained infected after three separate infusions of penicillin. In this experiment 14 of 18 treated cows were cured.

Experiments with penicillin for mastitis are under way now at the Veterinary Research Institute of Iowa State College. Results of this work will be reported later.

—*Farm Science Reporter*

Bigger Crops at a Profit

Condensed from American Agriculturist

George Serviss

Ever since superphosphate was made readily available to farmers there has been considerable discussion of the the value of a superphosphate fertilization program as compared to a so-called complete fertilizer program. Some even argue against using any superphosphate and seem to forget that there is more superphosphate than anything else in most grades of mixed fertilizer. They also often fail to realize that a small dose of a complete fertilizer, such as a 4-12-4, may not do a more complete job of fertilization than would the same quantity of superphosphate. If 120 pounds of nitrogen are needed to produce a 15 ton crop of silage corn, 200 pounds to the acre of a mixed fertilizer containing 4% nitrogen (8 pounds) is not complete fertilization.

The really important thing is not a question of superphosphate versus mixed goods. It is a question of fertilizing crops or feed-crop rotations to secure maximum profitable crop yields. What should be used is what is needed.

If the crop needs for all nutrients are not supplied one way or another in a farm fertilization program, yields will be reduced. If the shortage of any one needed nutrient is severe enough, the crop will be a failure no matter how ample the supply of other nutrients. A shortage of one nutrient can not be made up by increasing the supply of another. To grow a successful crop, all of the nutrients needed for plant growth must come from somewhere, but they do not always need to come entirely out of the fertilizer bag.

For a "superphosphate only" program to be successful, the other needed plant foods must be supplied somehow.

First, lime must be applied in sufficient quantities to grow legumes successfully.

Second, the soil must have good capacity to supply potash. Some soils do not.

Third, the minor elements essential for plant growth such as manganese and boron must be present in the soil in adequate quantities.

Fourth, a regular rotation must be followed in which legumes are included to supply nitrogen, and not more than two years should elapse between a good stand of legumes and a non-legume crop.

Fifth, it must be a livestock

Reprinted by permission from American Agriculturist, Dec. 1, 1945, Poughkeepsie, N.Y.

farm stocked close to capacity, and the manure must not only be returned to the soil, but distributed equitably over the crop acreage, including the improved permanent pasture.

This happy combination of conditions does not exist on many farms. The soil may have very low potash supplying power. Legume seedings may fail. There may be distant fields to which it is not practical to haul manure. Few farmers, too, are willing to plow up fairly good stands of legumes and will crop some fields with non-legume crops for several years in succession rather than do so. This draws the available nitrogen and often the available potash down to very low levels. Also, sods that are left down for a year or two after the legumes have gone out are not likely to supply very much nitrogen for succeeding non-legume crops.

It thus becomes apparent that on the average dairy farm there are often places where fertilizer other than superphosphate can be profitably used. Sometimes a single material like ammonium nitrate or muriate of potash may be the wisest selection. At other times a mixed up fertilizer may be called for. Even under ideal conditions there are times when the use of other fertilizers than superphosphate will profitably increase yields. This is especially true in areas where land values and labor are high and acreage is limited. For instance, in areas where hay is usually worth $30 to $40 a ton, a more intensive fertilization program is in order than in areas where hay is usually worth only $15.

Superphosphate, though, might well be called the basic fertilizer for dairy farms. It is very good business for a dairyman to invest in 30 to 50 pounds of superphosphate for each ton of manure produced by his stock. Some dairymen, especially during the first few years of a fertilization program, may find it profitable to apply superphosphate at heavier rates than this, so that some reserve of phosphoric acid is built up in the soil. On most farms, after the manure has been adequately supplemented, it will generally be more profitable to invest in other fertilizers than in additional superphosphate.

No set of fertilizer recommendations have yet been drawn up that are anywhere near perfect. They chart the course fairly well, but do not pilot the ship. In the final analysis, to do a really intelligent job of fertilization the farmer must know his soil, be acquainted with the results of fertilizer experiments, must have a good knowledge of fertilizers, and must know the plant food requirements of the various crops he grows.

Good soil tests are a help, but

poor ones are not. Soil testing is still in its infancy, but some tests have recently been perfected to the point where they are very helpful. These are very useful, when in competent hands, as trouble shooters for detecting deficiencies and as yardsticks for measuring the general level of available plant foods such as phosphoric acid and potash. They do not, though, tell you how many pounds of the exact analysis it will be most profitable to apply. Along with their use must go some good common "horse sense."

To sum things up, it seems logical that fertilization should be aimed at securing maximum profitable production. This is often a little short of the highest possible acre yields, but is considerably above average yields. Labor and other costs today are too high for low yields to be profitable. Intelligent fertilization may increase the cost per acre, but will decrease the cost of producing a bushel of corn or a ton of hay. The dairy farmer should use the fertilizers needed on his farm whether they be materials or mixed goods. These materials should supplement the plant foods contained in the soil, in manure and crop residues. Blind adherence to a single fertilizer material or mixture because it once gave good results on a particular crop may be profitable at low levels of fertilization, but can only result in failure to secure maximum returns on fertilizer dollars.

American Bulls to Greece

Recently six purebred American Brown Swiss bulls were shipped to Greece to help rebuild their depleted stock. Artificial insemination will be practiced, both to permit the use of better sires and to conserve shipping space. This is said to be the first such project in war-torn Europe.

—*Electricty on the Farm*

The Dairy Service Unit

Condensed from The Ohio Farmer

E. W. McMunn

WHEN members of the Holmes County Dairy Service Unit held a sale of production tested cattle at Millersburg late in October they added another "first" to their list of accomplishments. For this was only one of several activities promoted by this group of dairy farmers. Just as the name implies, purpose of the organization is to render service to its members.

Plan of the dairy service unit is simple. It is to set up one organization and then have that one provide testing service, artificial breeding, a market for surplus cattle or any other service the members may decide upon. With one of these units in operation, it is no longer necessary for dairymen of a county to set up a new organization every time they decide to start a new project.

Let's see what the Holmes County Dairy Service Unit has accomplished since it was organized early in 1944. The owner-sampler testing program in the county is probably the first thing to attract attention. By letting the herd owner take his own samples and then testing these samples at a central point, it has been possible to cut the cost per cow to a fraction of that charged in a regular dairy herd improvement association. Result has been a volume of testing that would have been impossible under conventional DHIA methods.

During the past year Holmes County dairymen had 1,500 cows in 150 herds on test by the owner-sampler method. This was ten times the number of cows on test in DHIA in the county. When we examine the rates we soon see why most dairymen prefer owner-sampler to DHIA testing. Charges in this county for owner-sampler testing are $1.50 per month for herds of 10 cows and less, with an additional 15c for all cows over 10. In other words, a man with 15 cows could get a monthly record on the production of his individual cows for a total of $2.25 per month.

One of the ideas back of this owner-sampler testing program of the dairy service unit is to test a large number of cows at a small charge per cow. To handle the volume of samples, all the testing is conducted at a new central testing laboratory recently completed at Millersburg.

Reprinted by permission from The Ohio Farmer, Cleveland, Ohio

Howard Kaser works as a part-time fieldman for the unit, collecting the samples from farmers in bottles previously distributed. The samples are taken to the central laboratory where they are tested by June Boyd who holds an official license from the State of Ohio to weigh, sample and test milk and cream. After the samples are tested, the records are mailed to the farmer with a monthly news letter. Thus he is kept informed how his herd and the individual cows in it are performing.

When owner-sampler testing was first proposed, the objection was often heard that such testing would be highly inaccurate or subject to downright dishonesty on the part of the herd owner. Results to date do not seem to bear out this contention.

Average of all owner-sampler records made in Holmes County to date show them to be slightly under the DHIA records. This is to be expected since there are so many more cows on test and it would be natural for some owners with the higher-producing herds to be willing to pay the higher cost for the more completely supervised DHIA records.

But the Holmes County Dairy Service Unit by no means confines itself to a testing program, important as that may be. Even ahead of the owner-sampler testing, it was making artificial breeding service available to its members. This service is obtained from the Northern Ohio Breeding Association at Tiffin.

The sale of production tested dairy cattle mentioned at the beginning of this story was another new activity sponsored by the service unit. The cows in milk were all sold on the basis of records they had made or were making and the young females were from dams with records. In this sale there was little mention of remote ancestors in a pedigree, directors of the association believing that farmers would be more interested in immediate production.

This Holmes County Service Unit is just one of many now organized in Ohio. Raymond Starbuck, extension dairy specialist, reports that Ohio now has 23 in operation and an additional five that will probably be organized or in operation by the end of the year. This will mean that by the start of 1946 there should be about 30,000 cows in testing units.

Another of the dairy service units with a well-organized program is in Delaware County. It was officially organized in January, 1945, after about two years of meeting and discussing the advantages of this unified dairy program. The Delaware Unit now has about 275 members.

Plant testing is being added as a service of this unit as the demand increases. The board of di-

rectors is considering some work on Bang's control and dairy cattle diseases. An additional service may be added next summer in providing a spray rig for whitewashing barns and fly control.

Accounts of the work in these two counties indicate the tasks that these dairy service units may perform. But their services will by no means need to be limited to testing, artificial breeding and plant testing. Already they are providing an organized way for dairymen to express their opinions on matters relating to dairying. For instance, last winter while the Ohio legislature was in session, the Holmes County group sent delegates to Columbus to represent them in legislative hearings regarding Bang's control. And so highly was their opinion regarded, that their local representative requested a meeting with this group to talk over matters of livestock disease control.

Small Grains as a Substitute for Corn

Small grains are expected to be substituted for corn in hog rations in some sections where corn is now scarce and hard to buy, according to Harry G. Russell, assistant professor of animal husbandry extension, University of Illinois.

In following this practice the producer should keep in mind the relative costs of the different grains and their value in replacing corn.

Wheat is a very good substitute for corn in hog feeding if the price is in line. Ordinarily, where it is to be hand fed, one can pay as much, pound for pound, as for corn and then grind the wheat. Where it is to be self-fed, the need for grinding is not so great, since the pigs chew it more thoroughly. Even then grinding will result in a saving of about 6 percent.

Barley is worth somewhat less than corn, pound for pound, as hog feed. It should be ground to a medium degree of fineness. With usual prices for grinding, barley may be valued at 80 to 85 percent of corn on a pound basis.

While oats have even more hull than barley, they can be used in the grain ration for hogs to the extent of 25 to 30 percent without reducing the rate of gain. At present prices and when properly used, they are probably more economical than wheat or corn in some localities. For brood sows oats should be finely ground.

—*Hampshire Herdsman*

Manure . . . Valuable Soil Builder

Condensed from Farm Science Reporter

H. B. Cheney and A. J. Englehorn

Good farmers for years have considered the manure produced on their farms a valuable fertilizer and many carefully conducted experiments have shown that these farmers have been right.

Here are some of the highlights of the value of manure which have come from our experiments at the Iowa Station, from experiments elsewhere and from calculations:

1. The manure produced on an average quarter section farm in Iowa is worth as much as the combined value of the oat and hay crops of the farm, or one-third the value of the corn crop.

2. The manure produced in the barns and lots has a crop producing value four times that of the limestone and commercial fertilizer used on the average Iowa farm.

3. On a highly fertile, dark-colored soil (Webster) at the Agronomy Farm at Ames, manure has been applied over a 30-year period at the rate of 8 tons to the acre once each 4 years in a 4-year rotation of corn, corn, oats and clover-timothy hay, and it has increased the value of the four crops in the rotation $19.12 an acre using 10-year average prices. Each ton of manure had an actual value of $2.39 in increasing the crop yields.

4. Manure applied to less fertile soils than the Webster has given even better yields, and its value per ton is higher when applied in amounts smaller than 8 tons per acre each 4 years.

5. The organic matter has declined only a third as fast where manure has been applied to soils as where it hasn't in plots at the Agronomy Farm of the Iowa Station. This was over a 20-year test period. Organic matter gives the soil its life, prevents it from baking and becoming cloddy, gives it capacity to hold water and makes more plant food available.

6. Because manure increases yields, the same amount of labor and power used in preparing the seedbed, planting, tending and harvesting a crop will give more bushels of grain or more tons of hay. Applying manure makes it possible to produce the same amount of crop from fewer acres.

7. A ton of well-preserved, mixed manure (bedding and droppings of animals) contains

Reprinted from the Farm Science Reporter, Oct., 1945, Ames, Iowa

plant food equal to about 100 pounds of a 10-5-10 commercial fertilizer; that is, 10 pounds of nitrogen, 5 pounds of phosphoric acid and 10 pounds of potash.

8. Manure helps prevent soil erosion by making the soil able to absorb more of the water which falls on it so that less water runs off. It also stimulates plant growth, which slows down surface runoff and favors water absorption.

9. Manure alone is not enough on most Iowa soils. Many of them are acid and need lime to grow legumes. Addition of phosphate fertilizer with manure and limestone is highly profitable on many Iowa farms. On sloping soils, contour tillage is essential.

Manure's Importance

Livestock on the average 160-acre Iowa farm produces about 280 tons of manure each year. Of this, 240 tons are available for cropland and the remainder falls on permanent pasture. Perhaps ⅓ of that available for cropland is dropped directly in the fields and the remainder, 160 tons, is dropped in the barns and lots. On the basis of its ability to increase crop yields, a ton of manure is worth about $2.40 using 10-year average prices. In terms of crop-producing value the average Iowa farm produces manure worth $570.

This same average Iowa farm produces a $1700 corn crop, a $240 oat crop and a $240 hay crop. Accordingly, the crop-producing value of manure, when unwasted, is more than equal to the value of the hay and oat crops combined or to ⅓ the value of the corn crop. It is worth ⅛ of the value of all livestock on the average Iowa farm Jan. 1, 1945.

A rough estimate of the amount of manure produced on an Iowa farm can be easily made from the weight of crops fed. At the Ohio Agricultural Experiment Station, an average of 1.5 pounds of manure was produced for each pound of crops fed or used as bedding. This manure was all carefully saved and kept under excellent storage conditions. This quantity is not saved on the average Iowa farm. Actually the loss from manure dropped in the barns and lots through heating and leaching is more than 50 percent on most Iowa farms. With reasonably good care, 1.0 pound of manure should be available for each pound of crops used on the farm. This method of calculation along with estimates based on the numbers of different kinds of livestock were used in the above comparisons.

The importance of manure can also be illustrated by comparing its crop-producing value with that of limestone and mineral fertilizer. The manure produced in the barns and lots has a potential crop-producing value equal to

four times that of the fertilizer and limestone used in 1944 on the average Iowa farm.

The ability of manure to increase the yield of crops has been recognized for centuries. Manure helps even good productive soils. The effects of manure have been studied since 1915 on Webster soil, a dark, highly fertile soil at the Agronomy Farm at Ames. A 4-year rotation of corn, corn, oats, and clover-timothy hay was followed. Part of the plots received no treatment. Others received an application of 8 tons of manure once each rotation. The manure was applied to the clover sod and plowed under for corn.

This rate of manuring is practical on livestock farms where the yields of corn and oats are 65 bushels per acre and hay yields 2.75 tons per acre. Actually, if all of the crops were fed, about 12 tons of manure would be produced per acre per rotation. With good management and allowing for some sale of crops, 8 tons could be saved to apply to the land. On most Iowa farms the amount of manure produced will be appreciably less than this. Moreover, as much as 50 percent of the value is easily lost by careless handling.

While good yields were obtained without any treatment other than a good rotation, manure (see table 1) increased the yields of all crops even though the soil on which it was used was very fertile. The yield of corn was increased an average of 10.8 bushels per acre; oats, 3.7 bushels per acre; and clover hay 0.58 ton.

Clover Increase Largest

Surprisingly enough, the largest percentage increase in yield was obtained on the clover hay. Though the manure was applied ahead of the corn, the clover crop was increased 27 percent while the corn showed a 20 percent increase in yield. Similar results

Table 1. Effect of Manure on the Yield of Crops in a 4-Year Rotation, Webster Series, Agronomy Farm, 1915-1938

Crop*	Yield per acre		Increase per acre when manured		
	No manure	8 tons manure**	In yield	Percent	In value***
Corn (bu.) (1st Yr.) . . .	56.1	67.9	11.8	21.1	$7.08
Corn (bu.) (2nd Yr.) . .	51.4	61.1	9.7	19.1	5.82
Oats (bu.)	60.0	63.7	3.7	6.2	1.29
Clover (tons)	2.12	2.70	0.58	27.3	4.93

*Includes 23 corn crops (1st year), 23 corn crops (2nd year), 23 oat crops and 19 clover crops.

**Manure applied on the clover sod.

***Based on average farm prices for 1934-1943; corn 60c per bushel, oats 35c per bushel, clover hay $8.50 per ton.

have been obtained in other experiments.

In this experiment, the manure resulted in increased crops worth $19.12 per acre per rotation according to calculations based on average farm prices for the period of 1934-1943. Each ton of manure produced increased crops worth $2.39. On less fertile soils even greater values than this are obtained. Also, manure applied at lower rates per acre usually gives larger increases per ton of manure.

The use of manure and other soil fertility and conservation practices means more production per acre; more food produced per farm; lowered production costs. On the basis of the data shown in table 1, 84 acres of land receiving manure will produce as much food as 100 acres without manure. Wise use of available manure allows greater production on the same number of acres.

Manure is a big aid in decreasing soil erosion. Two of the primary causes of erosion are the loss of soil organic matter and insufficient vegetative protection. Manure contributes towards the solution of both of these problems.

As shown in table 3, manure helps to slow up the decline in soil organic matter. This is done in two ways, by direct additions to the supply and by stimulating more plant growth. Improvement in plant growth also furnishes a more effective canopy of leaves and stems, which breaks the fall of the raindrops, thus slowing up surface runoff, increasing absorption and decreasing erosion.

On the Agronomy Farm fertility plots at Ames, several rotations and soil treatments have been studied continuously since 1915. In 1917 and 20 years later, in 1937, soil samples were obtained to study the effects of the various treatments on the soil.

The organic matter content of the soil declined under all systems of management, but much more rapidly under some systems than under others. Manure greatly slowed up the decline in organic matter depletion. Under continuous corn the decline with manure was only one-third as great as where no manure was used. Where manure was used in a 4-year rotation, organic matter losses were reduced to a very low level.

The trend in nitrogen content of the soil followed closely that of the organic matter, as might be expected since nitrogen is an essential part of soil organic matter or humus. In Iowa soils the organic matter contains close to 5 percent of nitrogen.

The advantages of a soil well supplied with organic matter are well recognized. When a soil loses its organic matter, it becomes lifeless, runs together badly, bakes

and becomes cloddy, loses its moisture-holding capacity and becomes lower in available plant food. A good supply of active organic matter is necessary in maintaining soil fertility.

The ability of manure to increase crop yields is due largely to its content of nitrogen, phosphorus and potassium. A ton of well-preserved mixed manure contains plant food nutrients equal to about 100 pounds of a 10-5-10 fertilizer; that is, 10 pounds of nitrogen, 5 pounds of phosphoric acid and 10 pounds of potash. At present prices the total plant food in a ton of manure would cost about $2.32 if bought in commercial fertilizer. One should remember, however, that the plant food in manure is somewhat more slowly available than that in mineral fertilizer. A number of experiments have shown that the benefit of manure is distributed over a long period of time.

The amount of plant food returned to the soil in manure influences fertilizer requirements and consumption. In Iowa, the number of livestock units is the largest of any state in the nation. Accordingly, the amount of manure produced is proportionately large.

As shown in table 2, 372,000 tons of plant food are returned to crop-land in Iowa annually, assuming that 60 percent of that available in manure is returned. This is over 15 times the plant food contained in commercial fertilizers sold in Iowa in 1944. Careless handling of manure results in losses of plant food equal to several times that contained in commercial fertilizers sold in 1944.

Manure alone is not a complete soil treatment. Most Iowa soils are acid and are improved by applying lime. On many soils, phosphate fertilizer and other mineral fertilizers are also needed for best results.

The need for a combination of soil fertility treatments is illustrated in figure 2. Although manure alone increased the yield of alfalfa, the addition of lime and superphosphate increased it still further in these experiments, manure was applied on the average at the rate of 2 tons per acre per year for the corn crop in the rotation. Limestone was used in suf-

Table 2. Plant Food Content of Manure and Commercial Fertilizer in Iowa, 1944

Item	Total amount in tons	Estimated plant food in tons
Commercial Fertilizer	99,900	24,700
Manure—Total available for cropland	50,000,000	620,000
Manure—Assuming 60% is saved and used on cropland	30,000,000	372,000

ficient amounts to neutralize soil acidity. Superphosphate was used at the rate of 120 pounds per acre of a 20 per cent material to all grain crops in the rotation.

The use of manure is, therefore, only one phase in a sound soil fertility and conservation program. It gives best results when used as a part of a good soil management program including adequate drainage, adapted crop rotation, liming of acid soils, use of commercial fertilizers, and contour farming and terracing on sloping soils.

Handling, Storing Manure

Careless handling and storing of manure often results in large losses. Greater returns can be obtained by:

1. Using sufficient bedding in barns and sheds to insure absorption of the liquid.

2. Hauling directly from the barns to the fields whenever possible. It should be plowed down or disked in as soon as possible, especially on sloping land.

3. Storing under a roof and on a water-tight floor. Manure keeps best when well compacted. Cattle sheds are ideal storage places.

4. Spreading ahead of corn.

5. Applying lightly. Greater returns per ton are obtained than with heavy applications. One should plan to cover all of the corn acreage.

6. Applying evenly.

Table 3. Effect of Manure on the Organic Matter Content of the Soil Clarion Series, Agronomy Farm, for 20-Year Period from 1917 to 1937

Cropping System	Manure Treatment	Average Loss of Organic Matter	
		Lb. Per Acre	Percent
Continuous Corn	None	18,100	18.9
	8 tons in 4 yrs.	5,400	6.2
Modified 4-Year Rotation (corn, oats, legume hay, wheat and 5 years alfalfa in 25)	None	8,600	10.2
	8 tons in 4 yrs.	1,200	1.5

Vegetables in Cellophane

Condensed from Pennsylvania Farmer

LEADING farm marketing specialists throughout the country have recently visited Columbus, O., to study the experiment under way there in the pre-packaging of fruits and vegetables. Some of these experts believe the project promises a great deal for farmers who grow perishables.

Tests conducted during the two years of the experiment indicate that the new method of handling produce will greatly reduce waste and spoilage and will increase the selling time of produce up to five or more days.

The program is a joint undertaking of A & P Food Stores and Ohio State University, in which all perishables (with the exception of potatoes and a few other staples) are wrapped in cellophane-covered, consumer-size packages and sold from open-type self-service refrigerator cases. Up to now the packaging has been done in the chain store's local warehouse, as no grower had the equipment to do the work on the farm nor the facilities for the accompanying research. However, the two leaders of the experiment, Frank McGeough of A & P and Dr. Charles W. Hauck of Ohio State's department of rural economics, believe since consumer acceptance has been shown that the time is near for doing the packaging at either the farm or in a cooperative or processing plant.

Of particular interest to farmers are the findings in regard to savings that can be made on shipping costs. Through trimming away the outer leaves and the stocks of cauliflower and using a lighter container, it is estimated that shipping weight is reduced 64 per cent. With carrots, trimming of the tops and washing of the vegetable saved 25 per cent. The same is true of many other items, so that in addition to the savings through reducing waste and spoilage, farm packaging will lower shipping costs.

Officials visualize the day when the trimmings, now an added cost as well as a nuisance in both homes and stores, can be turned into a profit through utilization as feed or for the making of fertilizer. Thus corn husks, trimmings from lettuce, cabbage, cauliflower and spinach may be fed to cattle, hogs and chickens.

"We have discovered that many consumer problems are closely related to those of the growers," McGeough says. "For instance, if a practical way is

Reprinted by permission from the Pennsylvania Farmer, Nov. 24, 1945, Pittsburgh, Pa.

found to shell lima beans mechanically we can increase the sale many times over present sales. We have found that shelled lima beans outsell the unshelled ones about 15 to 1. Our big difficulty has been to find a sheller that will not bruise the beans and up to now we have been unsuccessful." He pointed out that the shellers used by canneries or the frozen food industry caused some bruising and while this was a handicap on the sale of the fresh item, it did not affect either the canned or the frozen product. The same is true of fresh peas with the cost of hand shelling too expensive to make this form of operation successful.

Consumer reaction to sweet corn is interesting. "Both growers and food distributors for years have realized — if some method were found to bring to consumers corn that retained its farm freshness — that the market for this vegetable would be almost unlimited," it was pointed out. "This fact is highlighted by a U. S. Department of Agriculture study which shows that 24 hours after it was picked and allowed to remain in room temperature, corn lost 80 per cent of its sugar content. However, as many of our major growing areas are so distant from metropolitan centers, it is impossible to do anything practical about it although great strides have been made in the earlier picking of the corn, precooling and direct deliveries to stores.

"We had our first practical experience with sweet corn early in this experiment, but were not satisfied with the results, sensational as they were in terms of increased sales. This year a shipment of sweet corn from Texas was husked in the warehouse, wrapped in cellophane and sold under refrigeration. All was quickly sold. We hope within a year or two sweet corn may be packaged at the farm so the original freshness can be sealed in and growers shown how greatly they can expand their sales."

The supervisory committee for the project, which may set a nationwide pattern, includes representatives of A & P, du Pont, Hussmann - Ligonier Co., Oliver Machine Co., Ohio Boxboard Co. and Ohio State University. These men believe there are three major problems to be solved before farm packaging operations can be successful:

1. Farmers will have to be convinced of the benefits they will derive from such operations.

2. Adequate machinery to shell beans and peas and husk corn will have to be made, and

3. More plentiful supplies of material, such as cellophane, refrigeration equipment, boxboard and packaging machines, will have to be made available. Dur-

ing the war the experiment had to limp along on short supplies so that despite efforts of officials to extend this method of selling produce to all A & P stores in Columbus, only seven have been equipped so far. For instance, du Pont estimates that it will require nearly another year before cellophane will be available in heavy volume.

New, Superior Grasses Mean Better Grazing

Condensed from The Western Farm Life

O. A. Fitzgerald

WHEN western stockmen begin their postwar range and pasture rebuilding projects—certain to be big—they will be so busy selecting from a long list of new and superior grasses they will not have much time to moan over the passing of the "good old bunchgrass days" —long a favorite western pastime.

Never in all history have stockmen had so many good grasses and legumes and so much research information upon which to draw. In the Pacific Northwest the soil conservation service has checked on more than 8,000 grasses and legumes for range and farm use. Out of its work in selecting and breeding have come some 300 grasses and 100 legumes that have a place, although for some varieties the place may be limited. For the Intermountain Region, the United States forest service has a schedule of grasses and planting procedures for ranges of all types and all elevations.

From the Intermountain Forest and Range experiment station comes the report that orchardgrass, a reliable part of most irrigated pasture mixtures in the West, has something to offer on depleted ranges. It has been found useful at intermediate and high elevations in Idaho, Utah, and Nevada. Its field of usefulness includes the upper edge of the mountain brush zone, all of the aspen zone, and up on the mountain sides. Of the species so far tested, orchardgrass has proved the best adapted for growing in partial shade.

Tall oatgrass, at present used mainly in irrigated pastures, is another variety which deserves wider use, declares the soil conservation service. Unless it is processed the fluffy, bearded seed

Reprinted by permission from Western Farm Life, Nov. 15, 1945, Denver, Colorado

cannot be handled through grain and grass drills. SCS technicians recommend running it twice through a hammer mill running at 720 revolutions per minute with a three-sixteenths inch screen. There is nothing to the belief that the seed so processed does not keep well when stored.

Use of big bluegrass in mixed seedings is recommended by the forest service in the Intermountain Region. In a test in which 17 grasses were forced to compete with sagebrush it yielded the most. In addition to its ability to compete with brush it has most of the good qualities of Kentucky blue and is more tolerant to dry conditions.

In the Southwest, considerable emphasis is being given to bur clover. An S C S official recently explained, "Among the many plants of the annual type ranges, bur clover stands out as the most desirable forage species for profitable livestock production." Contrary to common belief that it is not adapted to certain soils the S C S has found it will grow on practically all soils from sandy to heavy adobe—providing they are moist.

Feeding trials at the Washington experiment station explain the growing popularity of legume-grass pastures in the Northwest. Two lots of steers on straight grass pasture produced 77 and 79 pounds of beef per acre. Four lots on various legume-grass mixtures produced 224, 227, 228 and 259 pounds of beef per acre—about three times more. A popular Washington combination is smooth brome and crested wheat with alfalfa. The big meat producer in the Washington study was bromegrass and alfalfa. It is also a well-known fact, reports the S C S, that a legume-grass mixture will increase by three times at least the erosion-resisting ability of the top 8 inches of soil.

Lamb-Fattening Mixture

Corn and early soybeans are planted together at the Paul Marriage farm in Foster County, North Dakota, as a balanced feed for fattening lambs. Sheep are turned in about September 1. Both ewes and lambs go into the field together. Part of the ewes are fattened for market each year. The grain and beans put enough flesh on those held over to make them winter well. A year ago Suffolk-Oxford lambs averaged 96 pounds and ewes sold weighed 190.

Tom Cousins, who also farms in Foster County, plants soys with his corn to produce silage of high quality. He has a trench silo 300 feet long in which to preserve the feed.

Aid Livestock Industry

Condensed from The Shorthorn World

G. C. Herring

Virginia Polytechnic Institute

A CONSIDERABLE amount of the time of livestock specialists and county agents is devoted to work in connection with sales of purebred livestock. The amount of time given to this phase of work often appears excessive and therefore the value of such sales to the livestock industry needs to be given careful appraisal.

Unless purebred livestock benefits the commercial producer, there is no legitimate excuse for it. The use of purebred animals can only be justified on the basis of yielding more net dollars.

Experiments and the experience of the best stockmen have definitely shown the superior value of purebred sires. This value may be in the increased gains of the get of a sire in the case of meat animals, or in the production of an animal which has a higher value per pound.

The use of purebred females in commercial production is open to question as it depends on the species of livestock and other factors. Nevertheless, purebred females are necessary in the maintenance of purebred herds and the establishment of new ones.

Granting that purebred livestock has a definite place in commercial production, we need only to compare the auction sale as a method of getting good animals into the hands of producers with other methods, such as by private treaty. The stockman who has a source of good breeding nearby or who doesn't mind going to considerable expense in travel might well make his purchases privately. However, many cannot do this and the purebred auction sales, most of them in Virginia having quite a number of breeders represented, offer an opportunity of selection which would not be possible otherwise. The benefit to the breeder is in being able to sell a number of animals at one time, and if his consignment is creditable, it may enable him to make other sales privately.

Here are some examples of the value of purebred sales. In 1924, the first commercial ram sale in Virginia was held at Staunton. It

Reprinted by permission from The Shorthorn World, Nov. 10, 1945, Aurora, Illinois

was impossible to find as many as 40 good rams in Virginia at that time and some were brought in from another state. The rams were bought outright by the Jersey City Stockyards Company and sold at auction to improve the breeding of Virginia lambs.

At that time Virginia lambs had a very bad reputation at Jersey City and the poor quality of them was said to be a major cause of glutted markets in midsummer. Sales of commercial rams have continued at Staunton and the lambs produced in that area are now among the best.

Ram sales are held at eight or nine other points in Virginia each year with around 250 head in all being offered. Virginia lambs now are well received by packers and the improvement in breeding has been an important factor; but, of course, other good practices must be given due credit.

The many sales of purebred cattle held in recent years have definitely aided in the marked improvement in commercial cow herds.

All the cooperative sales of purebred livestock in Virginia require inspection of animals by a committee whose main job is to weed out inferior animals. If poor ones do get in a sale, they suffer by comparison. There is a certain amount of educational value in sales too, whether animals are actually judged or not.

It is recognized that there have been some evils developed around the auction system of selling purebred animals, but there are just as many or more in private selling. The auction sales in Virginia, as a whole, have been well-conducted and have greatly benefited the state in its program of improving the quality of farm animals.

Wisconsin's Co-Op Log Yards

Condensed from Soil Conservation

John W. Keller

Assistant Chief, Forestry Division, Soil Conservation Service, Washington, D. C.

THE marketing of farm woodland products frequently presents a stumbling block to carrying out soil conservation programs. Where there are few local markets and a lack of understanding exists as to scaling rules and grading methods, farmers are reluctant to spend time and effort protecting and managing their woodlands. Under these conditions, their products are likely to be of low grade and they seldom get full value. Many examples have been reported in which the prices received by the farmer were so low that he scarcely made wages and it did not pay to harvest the trees.

Soil Conservation Service workers in Dunn County, Wis., where 20 percent of the farm area is in woodland, decided that something should be done to remedy the situation. Martin M. Keliher, district conservationist, and Helmer Anderson, forester, went into the matter with the Dunn County Soil Conservation District Supervisors, the Extension Service and the board of directors of the Farmers Union. The Wisconsin co-op yards resulted.

By the time the log yards had been in operation a year, there had been a noticeable upswing in farmer interest not only in farm woodlands but in the soil conservation program as a whole. This started when farmers began to consider wood products as a farm crop and set about to protect their woodlands from fire and grazing.

The log yards are managed by a definitely "going" farmer organization. Each has developed around an already established organization, usually a co-operative oil company, a produce company, an equity warehouse, or a creamery. The yard agency makes a charge per unit of product. For handling logs, this charge ranges from $2.50 to $5 per thousand board feet and covers the costs of loading logs, keeping records of assembling and selling, making payment to co-operators, obtaining trackage rights and storage facilities, and other expense items. The farmer marks each log with his identification mark or name

Reprinted by permission from Soil Conservation, Nov., 1945, Washington, D. C.

and makes delivery to the yard. When sufficient logs have been assembled for shipment, the co-op manager orders railroad cars for shipping, arranges for the purchasing company and the Soil Conservation Service to have representatives on hand to scale and grade, provides for loading, and attends to all other shipping details. The large veneer companies are interested in the yards and have guaranteed prices during certain periods. This enables the co-op to quote to farmers the exact prices obtainable for their logs. The purchaser sends a check in payment to the co-op manager, who deducts the handling charge and sends individual checks to the farmers.

Veneer logs have been the principal product, because farmers can get very favorable prices for No. 1 logs. The prices for No. 1 veneer logs in the yard range from $50 per thousand for ash and elm to $110 for yellow birch scaled by the Scribner Decimal "C" log rule. No. 2 veneer logs are worth about half as much as No. 1's and No. 3's bring about $5 to $10 less than No. 2's, or the same price as low-grade sawlogs. Co-op log yards can handle all kinds of products from farm woodlands.

Forestry specialists of the Soil Conservation Service report that the secret of getting high prices for wood products lies in the grading and that, particularly in the cases of veneer logs, farmers must know how to cut logs to get the highest grades. According to grading scales established by the OPA for veneer logs in Wisconsin, short No. 1 logs must be 12 inches or larger in diameter and must be clear of defects, 10-foot logs must have 5 feet of clear surface and not more than one standard defect, and 14- and 16-foot logs must have 7 and 8 feet clear, respectively, with not more than three standard defects. Deductions are made for heart rot, spiral grain, crotches, and crook exceeding specified minima.

Products are sold by the co-op manager to competing companies under contracts taking into consideration not only prices but also severity of application of grading rules and other factors that influence the amounts received by the farmers. When competition is keen the purchasing companies depend upon the log yards, and they have appreciated the part played by them. The soil conservation districts enjoy a fine reputation for square dealing with both farmers and purchasing companies.

Neither the soil conservation district nor the co-op limits its assistance to district co-operators. Mimeographed statements, new releases, and letters from the Soil Conservation Service keep farmers informed concerning

prices, species, grades, and related matters. Farmers may deliver from one log to a carload to the log yard at any time during the year.

The first of the log yards was started at Menomonie, in Dunn County, in November, 1943. Here the soil conservation district supervisors observed that there was a definite need for simplified marketing of farm woodland products. Many farmers who had shipped large quantities of logs had experienced such large losses that they would not even consider selling logs any more. Farmers with only a few logs to sell had no outlet for their products. The log yard at Menomonie was so successful that before the shipping year was over five other yards were in operation in this county at convenient railroad sidings providing shortest haul for the largest number of interested farmers. These six yards were managed by the Farmers Union Co-op. They shipped 155 carloads of logs that averaged 5,500 board feet log scale. The plan for handling No. 2 and No. 3 logs was not uniform. In some cases a farmer brought in only No. 1 veneer logs, and had a portable sawmill come to his farm to saw the low-grade logs for home use. The Menomonie and Ridgeland yards offered farmers their choice of having their low-grade logs sawed at the yard or having them sold to manufacturers as logs. These yards held the No. 2 and No. 3 logs for lumber and ties processed by sawmills set up at the yards. The ties were sold by the co-op manager, but most of the rough lumber was taken home for use in repairs and construction about the farm. More than a thousand ties and a quarter million board feet of rough lumber were handled for the convenience of the farmers. The slabs were either hauled home by the farmer or sold at the yard for fuel. The regular co-op labor crew loaded the logs. The Service forestry specialist taught the farmers how to cut, scale and grade, and assisted the co-op manager to check-scale all logs sold.

During the first year 150 farmers marketed logs, lumber and ties through the log yards and over 50 farmers had lumber and ties sawed at the yards. Six hundred farmers either came to the soil conservation district office for assistance in managing farm woodlands or attended meetings held in the woods. The Dunn County Soil Conservation District printed and distributed over 600 handy pocket log scales so that farmers could scale their own logs. The district also furnished interested farmers and co-operators with scaling procedures, grading practices, current data on markets and prices, and mimeographed instructions.

A tabulation was made of 55 farmers within the Dunn County Soil Conservation District who were not district co-operators but with whom contact was made through this marketing program. When Soil Conservation Service technicians are on a farm assisting with woodland problems, they talk with the farmer about crops, pastures, soil erosion, and the entire soil conservation district program. Of these 55 farmers, 40 actually sold logs through the log yards, 27 carried out conservation practices in selecting and cutting trees, and 34 showed interest in the entire soil conservation program. Of the last-mentioned group 12, as a result of this contact, had conservation plans made for their farms or signed district agreements, 6 put in contour or strip crops, and 3 fenced out woodlands.

The co-op yard movement has spread to surrounding soil conservation districts. During the year ending April 30, 1945, a total of 22 yards were operating in seven counties in Wisconsin.

Soil conservation district supervisors and all interested agencies report that the Wisconsin co-operative log yards definitely have been a success. Benefits from operation of the yards may be summarized as follows:

1. The farmer has been relieved of all marketing difficulties in selling woodland products.

2. The co-op manager has access to the best markets, because he sells in large quantities, and can demand the highest prices.

3. Record-keeping details and the heavy work of loading are handled by the co-op at a low charge per thousand board feet.

4. Marketing facilities are available to any farmer who has even one log for sale.

5. All sales are check-scaled by the co-op manager and maybe spot check-scaled by Soil Conservation Service technicians until the co-op manager is thoroughly familiar with the job. This service is recognized as one that should not be continued indefinitely on a free basis.

Little Farmers Find Big Profit in Cheese

Condensed from The Southern Planter

ABOUT a dozen years ago, at the depth of the depression, when the bottom dropped out of fluid milk prices, a little group of dairymen living along the Roanoke River and in nearby mountain coves a few miles out of Blacksburg, Virginia, joined hands in a new type of dairy venture for the Old Dominion. These farmers were getting only 62 cents a hundred for 4 per cent milk in 1932 and 20 cents of that went for hauling, leaving 42 cents a hundred for feeding, milking and managing their dairy herds. They couldn't make buckle and tongue meet.

They asked for more money for their milk and the condensery officials answered, "You'll do us a favor if you keep your milk at home!" They did. They poured it into vats and made American cheese. The skeptics said it couldn't be done. "You can't afford to use high-priced market milk for cheese-making." But nothing succeeds like success. They have done it. They are turning out 700 pounds of high-quality cheese each day from a neat little factory nestled in between the mountains, are getting from $2.80 to $3.15 per hundred for their milk and taking the whey back home for hog feed. Cream from the whey, separated at the factory, nets enough to pay for making the cheese. They are releasing over $6,000 a month to 70 of the most prosperous small farmers in Virginia.

We visited this cheese plant recently, the only one in Virginia, and saw with our own eyes what plain, dirt farmers can do for themselves when they face a "do or die" proposition like the dairy dilemma that confronted them during the dark days of the depression. Guiding genius of the co-operative cheese venture was Professor Wm. D. Saunders, cheese specialist of V. P. I., whose patented process for making a rapid ripening American cheese from milk with considerable acid has enabled these dairymen to produce a product of a quality unsurpassed and rarely equaled anywhere on this continent. They built their reputation by producing a better cheese; one that consumers call for in grocery stores and are willing, in many cases, to pay several cents more per pound to get.

The first cheese was made in a discarded vat secured in Southside, Virginia, and heated with an old worn-out boiler bought "for a song" in Grayson County. The second - hand equipment was

Reprinted by permission from The Southern Planter, Nov., 1945, Richmond, Virginia

housed in a milk shed. The rent was $3 per month. The cheese company was named Roanoke Valley Cheese Cooperative. And it is just that—the men who make the milk, make the cheese; they market it and pocket the money. Today the group doesn't owe a dime. They own outright an up-to-date plant and all equipment, valued at nearly $20,000. They started with less than 25 farmers and today have over 70 sending milk to the modern factory.

During the war, 70 per cent of the cheese went to the Government. The balance went to stores in nearby Blacksburg, Christiansburg, Radford and Roanoke. "But we have shipped cheese all over the country," said L.C. McPherson, president of the organization and largest milk producer in the valley. "Everywhere our cheese goes it makes friends. A half dozen big cheese concerns and milk companies have attempted to buy us out. We aren't for sale, but our cheese is!"

Mr. McPherson milks around 20 cows and raises 100 hogs a year, using the whey as a major feed for the swine. His calves, except for a few good heifers kept for replacements, are sold for veal at 200 pounds. And like his neighbors, he does general grass and grain farming. Some dairymen keep as few as two cows. The bulk of the milk is produced on grass — the cheapest milk any dairyman can produce. The evening milk is held over night, mixed with the morning milk and all sold together. Some acid does not injure the milk for cheese making by the Saunders method. And this is important in the South where farm refrigeration is difficult and milk plants regularly return sour milk to the farms.

This cheese development in Roanoke Valley is a practical demonstration of self-help among farmers to solve their own problems in their own way, and to the everlasting benefit of their community and country. It proves that the South has in the Saunders method of making cheese a chance to excell over other areas. We can produce cheese cheaper, turn out a better product that will ripen in half the time, and do it with grassland farming, the crying need of the South's sick soils.

The Roanoke Valley folks are improving their land with livestock. They are liming and fertilizing their grassland and hay fields. Barns and buildings are being improved. The people are living better. They are eating more dairy and meat products because they are producing more. Cheese is on every farm table. And the future is bright, Mr. McPherson points out, "because we could sell 10 cheeses for every one we can produce. Our cheese has been shipped to servicemen all over the world."

What's This Hay Worth?

Condensed from Marketing Activities

"THIS hay wouldn't make good bedding."

"Man, what are you talking about? That's as good hay as any we put up in my part of the country."

And so the argument has gone on and on — usually with the buyer and the seller becoming convinced that the other fellow is trying to cheat. Both of them could be perfectly sincere, both could be trying their best to tell the truth.

To anyone acquainted with the type of alfalfa produced in sections of southern California, the hay produced in areas of nightly dews and occasional rains in the eastern parts of the United States *may* look like bedding. The Northeastern dairy farmer wants good green hay, not brown stemmy hay.

One man has some hay to sell, another has some cows that need hay. Can't they get together without misunderstanding?

The answer is that they surely can—easily.

They can deal on the basis of U. S. grades of hay. The buyer can do the same thing that the U. S. Government itself does: he can say that he wants so much U. S. No. 1 alfalfa hay or any of the other grades and kinds. On the other hand, if he has to sell he can say that he has U S. No. 2 alfalfa or whatever it is.

The buyer or seller who has never used the grades might wonder why the words in the U. S. grades are any better than the words he has used. But when the seller said he was selling green hay, the buyer said it wasn't green at all. There were many points about which there could be a dispute.

As against that situation, let's see how the words in the official hay standards have come to mean the same thing from one end of the country to the other. Take green, the color that all hay buyers want in their purchases. The green of the alfalfa in Colorado is one color, that of timothy in New York is another, and of lespedeza in Tennessee is still another. Which of these greens is meant in the official standards?

Specialists at the Department of Agriculture have learned a lot about how to define "green" in terms of hue, chroma, and brilliance. When you have followed all the definitions they'll tell you that it is only hue that matters in hay; it doesn't make any difference whether it is a light green or a dark green, a bright or a dull one. Then to show you just how they

Reprinted by permission from Marketing Activities, Oct., 1945, Washington, D. C.

tell whether hay has the amount of green needed to conform to the standard for a certain grade, they will take you to a machine in the hay laboratory. That machine through an arrangement of lenses and mirrors focuses the color of the green of the hay in the upper half of a circle that looks about as large as a dime, and focuses the mixed colors of two color plates on the other half of that circle. Different mixtures of the two color plates can be made by varying the proportion of green and buff. When the two colors in the dime-size disk exactly match, you can look at the color plates and tell whether the color is what the physicists call green or whether it is a combination of that and some other color. It is just a matter of matching the colors in the two halves of the circle, and then reading the figures on the color charts. The color charts were the same yesterday as they are today and will be tomorrow. They are the same in New Hampshire as in Nevada, Ohio, and Oregon.

This colorometer (color-measuring machine) is used only to measure the color in samples of hay. These samples illustrate the color range from the top to the bottom of a given type of hay, such as alfalfa, timothy, or prairie hay. These samples are tested in hay-grading schools in teaching inspectors the color requirements of the different hay types.

What about some of the other points covered by the grades—leafiness for example? If you visited the laboratory you could see how samples are separated into the portions that are leaf and stems, and how separations of the same kind are made to determine exactly how much foreign matter there is in a given sample. And percentage figures are the same in all parts of the country; there is no ambiguity about the meaning of the percentage of leaves or of foreign matter.

As it is with these three factors so with others. The words in the standards have the same meaning wherever and whenever they are used.

That is one good reason for using the U. S. hay grades.

There is another one that parallels it pretty well. Feeding value in general varies with the grade of hay—the higher the grade the higher the feeding value. Just take protein and vitamin A content as indicative of the feeding value of hay. No. 1 alfalfa has 16 per cent protein, No. 3 has only 12 per cent. No. 1 alfalfa has from 6 to 10 times as much vitamin A in it as No. 3.

And there's a third good reason. You can enlist the services of an expert and impartial hay grader to tell exactly what the grade of hay is. If misunderstanding and disagreement get into a United States court, the certificate

of the grade will be taken as prima facie evidence of the grade.

So they enable farmers who have hay to sell to describe it exactly. They enable other farmers to tell exactly what kind of hay they want. And they are interpreted and enforced by a well-trained and impartial group of inspectors whose services are available anywhere in the country. Those are three good recommendations for the U. S. hay grades.

Ground Roosts Save Time

Doing away with the roosts after turkey poults are 14 weeks old saves a lot of labor in raising 9,000 to 9,500 turkeys on the Springhaven Farm in Johnson County, according to R. H. Campbell, farm manager. Poults on this farm roost on the ground after 14 weeks.

"Roosts take up too much room, require one-half day a week to move, and cause stampeding among the birds," says Mr. Campbell. Letting them roost on the ground saves all the labor and reduces stampeding.

A program that calls for ground roosting and moving to new ground weekly pays off, as this farm had losses last year of only one half of 1 per cent. A 2-year interval is allowed before turkeys are ever placed on the same ground. "You never have to worry about blackhead in a turkey flock if you move them often enough," says Mr. Campbell. "Ours are moved every week, rain or shine."

Poults on this farm are started in electric batteries. At 1½ weeks old they are transferred to growing batteries. When 4 weeks old they are put on wire sun porches and go to range at 8 to 10 weeks.

This year the wire floors are being changed to slats as some trouble has been experienced from poults getting caught in the wire. Brome and sudan pasture are used on the range and Mr. Campbell plans on an alfalfa-brome mixture for next year.

A breeding flock of 500 to 1,000 hens is kept on the farm, which sells 25,000 to 30,000 hatching eggs a year. This is an approved flock and all breeding stock is selected by the Kansas Poultry Improvement Association.

Two groups of toms are used in rotation, 2 weeks for each group, which brings the ratio to 1 tom for every 5 hens. Three broody pens are used in rotation to cure broodiness in a 3-day period. Last year the breeding hens averaged 52 eggs each, which is above requirements for R. O. P. standards.

J. E. Tillotson, of Kansas City, Mo., is owner of the farm.

—*Kansas Farmer*

Avian Leukosis Complex

Condensed from American Poultry Journal

C. D. Lee

A GREAT many poultry people have encountered conditions in chickens such as range or fowl paralysis, big liver disease, large bone or marble bone disease and so-called grey eye. These various conditions, more aptly described as "The Avian Leukosis Complex," have been the cause of a greater money loss to the poultry producer than any other single disease during the past 15 years.

People engaged in poultry disease research are not in agreement as to all the causes of these manifestations, but in general do at least agree to the fact that they are all closely related.

Avian Leukosis is an infectious disease of chickens possibly due to a filterable virus. Young chickens are more susceptible than older birds, and in general the younger the chick, the more susceptible it is. It is a disease with a long incubation period, that is, a long period elapses from the time infection occurs until symptoms appear or mortality results. In general, most losses or symptoms occur in chickens between the ages of 4 and 8 months, with the peak at about 6 months. It is believed that cases occurring in older birds are those with an arrested incubation period or their infection is one of low virulence, and these birds were affected at an early age, or they have a higher degree of resistance to the disease.

The disease may be transmitted by direct contact of chicks with infected birds, infected premises, or infected equipment, and the earlier exposure occurs, the higher the mortality will be in the adult stock.

The experimental work of Hutt and others at Cornell University shows it is possible to reduce mortality in adult birds by maintaining a good quarantine environment for the first 2 weeks. This means that for the first 2 weeks, at least, chicks should be brooded as far away as possible from old stock, or premises where old stock is kept, and possibly cared for by someone having no contact with old birds.

This procedure can only reduce losses if the stock from which the chicks originated is free and no transmission by an egg-borne germ has occurred.

Experimental evidence at the Poultry Regional Laboratory at East Lansing, Mich., has shown

Reprinted by permission from the American Poultry Journal, Dec., 1945, Chicago, Ill.

that avian lymphomatosis occurred in chickens reared throughout life in strict isolation and under conditions of ideal sanitary practices.

The results of these experiments in many ways are quite similar to field experiences by many poultry raisers. In many instances, chicks have been taken as day-old, directly from incubators, placed in new houses, with new equpiment and on clean range or ground where chickens have never been or chicken manure has never been spread. In some cases, mortality from some form of the Avian Leukosis complex has reached as high as 40% in chickens under 4 months of age. In these cases, all possibility of contact cannot be eliminated but is very remote.

Experiments at this laboratory have shown that while environment is a very important factor in control of Avian Leukosis, transmission by way of the eggs of infected parents is probably the greatest source of transmission under natural or experimental conditions.

In conducting transmission experiments, birds showing the so-called grey eye or iritis type of the disease were used in making matings for production of chicks. In general, a pen was made up of 20 females showing iritis in the form of grey or faded iris or distorted pupils mated to a male which was at least clinically free from the disease. Matings were also made of 20 affected females and an affected male and 20 normal females and an affected male. The matings were in separate buildings and away from any other chickens. The birds were trapnested, and the chicks were hatched in separate incubators, pedigreed and then placed in individual colony houses under complete isolation, and at no time were allowed on the ground. The person who cared for these chicks had no other contact with chickens.

The experiment was continued for about 330 days. In the lot hatched from affected male and females, about 60% of the chicks died or were killed because of symptoms of some type of the avian leukosis complex. In the lots where only females were affected, 52% of the progeny became affected. In the groups where the females were normal but the male was affected, only 6% became affected. This type of experimentation has been carried on over several years, and while percentages were not the same each year, the general pattern of transmission was.

In order to study transmission further, blood of chicks hatched of affected parents was inoculated into susceptible day-old and week-old chicks from our own avian leukosis-free stock. The

blood was taken directly from the heart of the donor chicken for inoculation, and in all cases, suitable controls were maintained from brothers and sisters of the inoculated birds. The progeny of affected stock used as donors were used as day-old chicks, and then as week-old, and at weekly and monthly intervals until donors as old as 11 months were used.

The results of these inoculations have shown that chicks hatched from infected parents contain the agent or agents of avian leukosis in the blood in sufficient amounts to infect chicks as high as 60% in some lots. The birds used as donors when as old as 11 months also contained the agent in the blood. Birds of this age, even though kept in quarantine, may gain infection from other sources.

The results indicate that birds with the iritis type of avian leukosis are capable of transmitting the disease in some form to their offspring by way of the egg. This does not preclude the same may be true of other birds showing no visible lesions of avian leukosis, as cases do occur in controlled quarantine pens where iritis is not present clinically. This, however, is purely circumstantial and still awaits proof.

The differences in mortality in a group of chickens may be due either to amounts of exposure, virulence of the agent, or resistance or susceptibility of the birds of a flock.

While the above may not eliminate all possibility of carrier birds, many poultry research workers have shown that resistant lines of chickens may be developed by good selection and breeding programs. This seems a desirable program and one which may be carried out under practical conditions.

In the light of our present knowledge of transmission of this disease and its insidious nature, one may only suggest the following for helpful control measures.

A rigid culling program eliminating all birds with grey eyes or irregular pupils, light colored combs and wattles, all lame or paralyzed birds or birds with abnormally large leg bones and birds extremely light without apparent cause, will greatly decrease the incidence of the disease or the carriers in a flock. This is a somewhat drastic program, and culling must be done frequently. The surviving birds in a flock where the disease has been prevalent may be highly resistant to the disease and will transmit this resistance to their progeny.

In no instances, should one hope that disposal of all birds and restocking from regular hatchery chicks will give the desired result. Restocked birds may be more susceptible than those disposed of. As it is yet unknown how

some transmissions take place, it will serve to reduce this hazard. The program cannot be completed in one year but may take several.

The chicks should be raised in close confinement away from old stock and in houses which have been carefully cleaned and equipment cleaned and disinfected. There should be no traffic between old birds and old lots to the young chicks. The young birds should be kept in isolation for at least 6 weeks.

In this control program as well as any other disease control program, a good program of sanitation, feeding, and management should accompany the above recommendations. While no one should construe the above recommendations as a sure fire control of Avian Leukosis, it has proven to be of great value in the control of this disease under farm conditions.

What's Manure Worth?

Chicken manure is worth two and a half times as much as cow manure. So says the Pennsylvania Experiment Station.

When nitrogen is worth 10 cents a pound, phosphorous five cents a pound, and potatoes four cents a pound, manure from hens is worth $4.29 a ton. Cow manure is worth only $1.71 a ton

One hundred hens make 266 pounds of manure a week. In a year, this production is worth about $30. In the seven months it takes to grow them to market weights, 100 turkeys will produce manure worth approximately $24.

Here are some Pennsylvania recommendations: three to four tons of poultry manure per acre is enough for farm crops. Because most manure spreaders spread at least six tons per acre, use poultry manure and stable manure half and half. Load the two kinds of manure in alternate layers, if you can.

If you use poultry manure in back yards and gardens, compost it. Then you can use it through the year. If you are going to use it on cultivated crops, plow or disk it in several weeks before seeding or transplanting.

If poultry manure is left in a pile it will heat, and lose most of its ammonia nitrogen. You can prevent loss of most of the nitrogen in dropping pits or on dropping boards by sprinkling 27 pounds of superphosphate per 100 hens each week, or 14 pounds of land plaster, or 11 ounces of borax.

—*Farm Journal*

Winter Herd Management

Condensed from The Hereford Journal

Ray H. Means

Associate in Animal Husbandry, Mississippi State College, State College, Miss.

COMMERCIAL beef cattle are ordinarily carried on the better improved permanent pastures in Mississippi about 265 days of the year, or from March 20 to December 10. As a rule, cattle begin to shrink on Dallis grass pasture during the first part of December, and for the remainder of the winter period it becomes necessary to supplement the permanent pastures with some other feeds in order to maintain the health and vigor of the cattle. The winter period is considered the critical period of the year with beef cattle producers, as it is during this period that beef cattle need special attention and the greatest number of losses occur.

It has been determined experimentally as well as by demonstrations by producers, that commercial beef cattle do as well, and in some cases probably better, if they are wintered out in the open rather than in a barn. The Mississippi Experiment Station has wintered beef cattle of different ages on various experimental rations both in barn and on the outside for a number of years, and a barn proved to be of little value in so far as protection was concerned. Also, it is thought that cattle that are carried through the winter in fields, pastures, meadows and wooded areas, are less likely to become infected with diseases than when they are congested in muddy paddocks and in barns.

Therefore, it is thought that money spent for barns to house beef cattle in Mississippi could be more profitably spent on additional feed such as cottonseed cake and roughage. In this connection might be mentioned, however, that cattle prefer a well-drained, wooded area to open, poorly drained land on which to bed down at night, and a wooded hillside seems to be all the barn that a thrifty beef herd needs during the winter.

Mississippi, as well as the other southern states, is in a very favorable position in regard to forage and roughage production; many of these crops, especially adapted to this section of the country, are utilized profitably by beef cattle. The varieties of forage and

Reprinted by permission from The Hereford Journal, Nov. 15, 1945, Kansas City, Mo.

hay crops vary somewhat with the soil type areas. For example, Johnson grass is one of the leading forage and hay crops in the northeast prairie belt but is not so well adapted to some of the lighter soils in other areas. Sorghum is the most dependable silage crop produced in the state, and there are several varieties of sorghum that are adapted to practically all soil types. Beef-cattle management practices are necessarily tied in very closely with the adaptation of varieties and species of forage and hay crops, and for this reason winter herd management practices vary considerably with soil type areas.

Most of the research work done with beef cattle in Mississippi has been carried on at the Central Station, located in the northeast prairie. During recent years, herds have been established at Holly Springs in the upper brown loam, near Natchez in the lower brown loam, and in the flat woods area. It is expected that beef-cattle stations will be located in other soil type areas of the state within a short time to help solve many of the management problems that are peculiar to the particular soil type area.

The rations listed in this report and the winter herd-management practices discussed, therefore, are based very largely on observations made with the beef cattle herd on the Mississippi Experiment Station farm, which is located in one of the better pasture and forage production areas of the state.

For 1,000-pound mature bred cows, 30 pounds of sorghum silage, five pounds of rough grass hay and one pound of cottonseed meal or cake, proved to be the most economical ration used. Twenty pounds of grass hay and one pound of cottonseed meal was satisfactory but not as economical as the silage ration. Twenty pounds of legume hay, with no protein supplement added, was entirely satisfactory but was even less economical than the grass hay-cottonseed meal ration. Thus, a ration of 1½ tons silage, one-fourth ton hay, and one sack cottonseed meal, has been provided for each mature beef cow for the 100-day winter period.

For weanling heifers weighing about 425 pounds, 15 pounds sorghum silage, 1½ pounds cottonseed meal and three pounds grass hay proved to be a satisfactory ration. For yearling heifers, 25 pounds sorghum silage, 1½ pounds cottonseed meal and five pounds grass hay was satisfactory.

On the above rations, the mature cows in thrifty condition gained from 50 to 70 pounds, or about the weight of the foetus, during the wintering period. The weanling and yearling heifers gained approximately one-half

pound per day, which represented normal growth for this period.

During recent years, beef cattle producers have been giving more consideration to carrying cattle through the winter on smaller amounts of harvested feeds and have used instead supplemental grazing crops, stacked hay, stalk fields, etc. In fact, they have eagerly sought any satisfactory method that would reduce labor costs in harvesting feed and in getting it to cattle during the winter.

The better Dallis grass pastures, when properly grazed, will produce a surplus of grass sometime during the grazing season. When the surplus growth occurs it should be clipped or mowed in order to provide succulent tender grazing. The clippings, if properly cured and stacked, will provide winter feed for the herd. On the Mississippi Experiment Station farm, the mature cows, yearlings, and weanling heifers have been carried satisfactorily through the winter in satisfactory condition on stacked pasture clippings. Little or no labor was required in the feeding operation with this method of wintering cattle, as they were allowed access to the stack at any time. On account of more or less waste, approximately two tons of clippings were required for each mature cow with this cafeteria system of feeding roughage.

Beef-cattle producers in Mississippi are utilizing supplemental grazing crops more each year in their winter herd management program. Oats, oats plus clover, and oats plus wild winter peas, seem to be the leading crops and combinations of crops for winter grazing purposes. From one to two acres of oats planted the latter part of August or early September at the rate of 100 pounds of seed per acre and fertilized with 32 pounds of nitrogen at planting time, should carry a mature cow through the winter except for brief periods of extremely wet weather. Wild winter peas or crimson clover added to the oats will improve both the quality and quantity of grazing.

While little research work has been done in the state to determine the most desirable winter grazing crops, along with the costs and returns from winter grazing, it is believed that there are many thousands of idle acres which, if properly managed, would yield profitable returns in terms of healthy vigorous animals and in beef produced. Also, further investigational work should be done on methods of saving quantity as well as quality roughages to be consumed by beef cattle during the winter period. Better adapted and more productive crops are always welcomed.

In conclusion, it might be said that the beef cattle program in

Mississippi is on a much sounder foundation than it has ever been before and many producers are in position to ride the cycle wave regardless of the direction of travel. The wintering problems are being solved along with other problems that occur during more favorable weather conditions.

Electric Chick Brooding Studies

Condensed from Electricity on the Farm

A RECENT publication by F. D. Yung and F. E. Mussehl of the University of Nebraska, Lincoln, Neb., gives some interesting conclusions about electric brooding.

"Observations indicate that relative humidities up to approximately 80 per cent are not detrimental to the continued health of the chicks provided the soiled litter is changed often enough to maintain acceptable sanitation. Chicks . . . showed excellent feathering and vigorous growth."

The following space allowance under the brooder is recommended:

Leghorns—10 square inches per chick

Heavier breeds—12 square inches per chick

Turkeys—20 square inches per chick

Indications are that units of not larger than 200 to 300 chicks have lower mortality, more even growth, and better general health and vigor than do large broods."

"One of the most important factors in economical brooder operation is insulation. The saving in cost of electricity effected by the use of insulation was plainly shown during the 1937 brooding season when a 200 chick insulated brooder made a saving of 97.5 kilowat hours in six weeks over a similar uninsulated brooder operated at the same time under similar conditions."

"Floor insulation is also very desirable for successful electric brooding during January, February and March."

250 watt infrared lamps in gold plated reflectors supported from the ceiling over the brooder house floor were tested in comparison with the Nebraska "standard" hover type brooder for 58 days starting in November. The cost of operation of the lamps was much higher than the hover, the comfort zones for chicks under the lamps were limited in area and there was more or less competition for occupancy of these zones, and the mortality under

Reprinted by permission from Electricity on the Farm, Nov., 1945, New York City

the lamps was 20 per cent while under the hover it was 1 per cent. The trials were only preliminary and the conclusions not definite.

In a comparison of two "standard" test brooders (2 ft. wide by 6 ft. long, flat top, wood construction, curtain in front but closed on 3 sides, heated with soil heating cable, 400 watts), one equipped with a small fan for ventilation "averaged 39 per cent relative humidity for the entire 6 weeks while that of the unventilated brooder averaged 67 per cent. There was no distinguishable difference in the general health and rate of growth of the chicks in the two brooders. These indications were not interpreted as applying necessarily to all brooders, since the brooders under comparison were only 2 feet wide from curtain to rear wall."

When brooders were made 3 feet or 4 feet wide (3 sides closed) and loaded proportionately, the chicks persistently clustered in the front half of the brooder near the curtain and did not use the rear space. Because of this, some piling up outside the curtain resulted.

Day and night samples of the stagnant air in the rear of these 3 and 4 foot hovers were taken. The maximum concentration of carbon dioxide was well under one per cent. In subsequent tests with chicks in airtight enclosures it was found that chicks did not show drowsiness or other evidences of discomfort until the concentration of carbon dioxide reached 5 or 6 per cent.

The bulletin gives comparisons of different methods of heating brooders and of other variations in design.

Handier Loader

A tractor manure loader that can be used inside the barn was made by J. H. Forell and Son, Eaton County, Michigan. It is used on a small tractor with a hydraulic-lift drawbar, and is attached to drawbar fittings to be operated by the tractor lift. It handles smaller loads than most loaders. Six to 9 scoopfuls are needed to fill a spreader.

Uses Factory Methods To Grow Broilers

Condensed from Poultry Tribune

Carl O. Dossin

Pennsylvania State College

THE specialized broiler grower is practicing mass production methods. He plans his buildings and equipment to obtain the greatest possible labor efficiency.

Raymond Miller has grown broilers for several years in southeastern Pennsylvania. On his home farm he has a two-story building with nine pens 28 by 28 feet and a feed room on each floor.

This building is equipped with gas brooders, feed carriers, automatic fountains, and other equipment to increase his labor efficiency. One thousand chicks are started in each pen and raised to market age or a total of 18,000 in each brood. Three lots of broilers are raised and sold each year from this building.

When Miller decided to expand his broiler business, he decided that it was more expedient to remodel a barn than to build a new building at that time. He purchased a nearby farm with a barn 52 x 84 which was converted into a broiler factory. There are four floors with 5,500 broilers each and a loft with 2,000, or a total of 24,000 in this building. A little less than one square foot of floor space is allowed for each broiler. All of these are taken care of by one man from day-old until they are marketed at about 13 weeks of age.

When this building was being converted, Miller planned everything so that one man could take care of the maximum number of birds. He appreciated that ventilation was one of the most important factors in maintaining health. All of the exposed walls of the building were insulated to conserve heat in the winter and to keep the building cool in the summer. Shafts were built in the building to help ventilate the basement and also the other pens in which cross-ventilation could not be provided.

The Connecticut slot type of ventilation was provided on all floors wherever possible. Those pens which had two sides which could be opened were provided with sliding windows and slot ventilators, front and rear. The slot ventilators make it possible to control ventilation when the

Reprinted from the Poultry Tribune, Sept., 1945, Mt. Morris, Illinois

windows might be frozen shut because of outside temperatures.

When Miller decided to convert this barn, he found it easier to obtain a hot water heating system than any other type of heating plant. A hot water heater with an automatic stoker is used in the building. There are circulating pumps and thermostatic controls for each floor. Because of the fact that the building is 52 feet deep, two auxiliary heating pipes are provided on each outside wall for use in case the outside temperature might become very low when the chicks are young.

Twelve 1¼ inch pipes, 20 inches above the floor, run through the center of each pen to supply heat for the chicks. These pipes extend to about eight feet from both end walls. This makes it possible for the attendant to walk around the brooding system rather than to have to climb over it.

Many growers do not have their pipes so high off the floor. The pipes are purposely put high in this building so that it will be convenient for the attendant to examine the chicks under the hover. Another advantage of having the height of the pipes and the amount of heat which is provided in this building is the fact that the pens can be kept drier, which is an aid in controlling coccidiosis. The pipes are covered by sheets of insulation board 3 feet by 12 which are laid upon them. Board flaps 18 inches wide are attached to the outside pipes by means of a strap iron hooked around them. These flaps can be raised or lowered by means of ropes and pulleys. When the chicks are very young, the flaps are lowered to deflect the heat.

When the chicks are young it is necessary to confine them to a limited area near the heat. This is done by means of a foot high wire. Small feeders and waterers are use at this time. To keep the chicks from scratching the litter, usually shavings or peanut shells, into the small feeders or fountains, straw is used to cover the fine litter.

Automatic waterers are arranged in two rows on each side of the brooder pipes and are spaced about ten feet apart. Growing chicks require lots of water. All of the waterers are equipped with drains so there is no danger of the pens becoming flooded.

The feed is raised to the top floor by means of a rope and pulley. It is then emptied into bins. There are chutes from the bins so that the feed may be drawn off at each floor. Miller uses a box type of feed carrier on each floor. The feed can be scooped from it directly into the feeders. Many broiler growers, however, prefer to use a flat type of carrier on which the bags are carried. The feed is then emptied from

the bags into the buckets to fill the feeders. One must realize that the fewer times that the feed is handled after the bags are opened, the less will be wasted.

The feeders are arranged in rows near the carrier track so that the chickens can be fed with a minimum of steps. The track for the carrier is so arranged that the attendant can feed all the chicks on one trip through each pen. It is attached to the ceiling between the two rows of drinking fountains.

Three lots of broilers weighing about 3½ pounds each are marketed each year. All of the birds are sold at one time so as to eliminate the danger of disease which exists when chicks of different ages are kept on the farm. When the broilers are sold, none of the poultry buyer's coops are brought into the building. The broilers are confined to a limited area within the pen by means of wire, then caught and handed out a window to the buyer who places them into the poultry coops.

The litter in the pens is not changed from the time that the chicks are put in until they are sold, but litter is added when needed. No effort is made to stir it because of the labor required. After the broilers are sold, a number of men are brought in to clean the building and wash the feeders and fountains to make ready for the next lot. Two to three weeks usually are allowed for this purpose. Four trap doors are located in each floor so the litter and manure can be dropped into a truck or manure spreader which can be backed into the building on the ground floor. This arrangement saves much labor at cleaning time. The litter and manure are hauled to Miller's home farm to be used in helping to raise a crop of 25 acres of celery and 45 acres of tomatoes.

Because of careful planning, one man can take care of the routine work for 24,000 broilers in this building.

Michigan's Cultivated Blueberry Industry

Condensed from American Fruit Grower

Stanley Johnston

South Haven Experiment Station

DESPITE the fact that the wild blueberry was present in great abundance when the first settlers arrived in this country, no serious attempts were made to bring it under cultivation for nearly 300 years. Principal reasons for this lack of interest in cultivating the blueberry were its reputation for disliking cultivation, and the abundant supply of wild berries which seemed to make the growing of this fruit under cultivation unnecessary.

In 1908 the U. S. Department of Agriculture, realizing that the supply of wild blueberries was rapidly diminishing, assigned the late Dr. F. V. Coville to the task of studying the cultural requirements of the blueberry. As the plant had the reputation of being very difficult to transplant, his first efforts were concerned with its soil requirements. From these studies, he learned that the blueberry plant required an acid soil, and that many of the failures accompanying transplanting the blueberry were due to transplanting to a neutral or alkaline soil. Dr. Coville made many other contributions to the development of the domesticated blueberry, especially through the breeding and selection of varieties producing berries of very large size.

Another pioneer in the improvement of the blueberry who has made, and is still making great contribution to the cultivated blueberry industry is Miss Elizabeth White of Whitesbog, New Jersey. Miss White offered cash prizes to pickers who were harvesting wild berries for any plants that they could find which produced berries a half-inch or more in diameter. She secured several varieties of merit in this way, one of which, Rubel, has been very widely grown. Dr. Coville used Miss White's collection of varieties for some of his fruit breeding work.

Because of the early work of Dr. Coville and Miss White in New Jersey, a commercial industry started there about 1918 which has grown into large proportions. In 1923 the Michigan Agricultural Experiment Station

Reprinted by permission from the American Fruit Grower, Nov., 1945, Cleveland, Ohio

started experimental work in blueberry culture at its South Haven Experiment Station. Since then research work in all phases of blueberry production has been conducted at this station. The first commercial planting in the state was made near Grand Junction in 1928 and now nearly 700 acres are in various stages of production. This year production will probably reach nearly one and one-half million pints of berries. Southwestern Michigan, in particular, has considerable areas of land suitable for blueberry culture and it is expected that the industry will reach proportions within a few years.

Climatic Requirements

The cultivated blueberry is of the highbush type and should not be confused with the lowbush blueberry often found growing in abundance in the northern parts of Michigan, Wisconsin, Minnesota, New York, throughout New England, and other places. Attempts to grow the highbush blueberry in Michigan north of the lower end of Saginaw Bay have been entirely successful. Any plantings of the highbush blueberry outside of its natural range should be on a small scale and considered experimental.

Frost is a serious menace to the blueberry crop. It is always more prevalent and serious in depressions or "pockets" and such sites should be avoided. Wide, open areas of large size are preferred.

It has already been mentioned that the blueberry plant must have an acid soil. In fact the soil must be very acid for best results. A soil somewhere within the pH range of 4.0 to 5.1 is considered best. Proper moisture conditions are also important. Tests have shown that plants grow best where the water table can be maintained from 14 to 22 inchs below the surface, although this ideal condition cannot always be maintained. Deviations from these conditions of acidity and moisture are reflected in poorer growth and lower yields, and in extreme cases, in the injury or death of the plants.

The blueberry is not easy to propagate by ordinary methods and requires special treatment as well as careful attention for successful results. Growers of small numbers of plants will no doubt find it cheaper and more convenient to purchase their plants from nurserymen or growers offering them for sale. There is also a considerable saving in time. Detailed information regarding methods of propagation is available for those who wish to attempt to grow their own plants.

Several good varieties of the improved blueberry are now available. They ripen in succession producing fruit over a period

of about two months. The most commonly grown varieties in Michigan at present in order of ripening are Stanley, Rubel and Jersey. The latter two ripen nearly together. New varieties under trial are Atlantic (midseason), Pemberton (midseason to late) and Burlington (very late).

Fruits of these improved varieties often are as large as three-fourths of an inch in diameter and average about one-half inch. They are much larger than wild blueberries and, if properly ripened, are of excellent flavor.

The planting distance most commonly used in Michigan is 10 ft. x 4 ft. This requires 1,089 plants per acre. Two-year plants are considered best for field planting, although three-year plants are excellent for this purpose if the price differential over two-year plants is not too great.

The blueberry plant is very shallow rooted and accordingly cultivation should be shallow. It should be frequent enough to keep down weeds. It is advisable to sow a cover crop of oats or a mixture of oats and buckwheat near the end of the harvesting season unless a natural weed cover crop can be obtained.

Excellent results have been obtained from the use of a complete fertilizer. At present an 8-8-8 formula is being used with the nitrogen being derived from several sources and the potash being derived from sulphate of potash. Injury has been observed from the use of muriate of potash on young plants. Five hundred pounds per acre of the complete fertilizer is an average application on full grown plants although more has been used to advantage on light, infertile soils.

Careful pruning is essential beginning the third year if berries of large size are to be produced. It has been found that heavy pruning results in larger berries, earlier maturity and a smaller crop. Later berries of smaller size are produced on lightly pruned bushes. Late berries have brought higher prices in Michigan. Therefore the tendency has been to use light to moderate pruning.

There are two insects that often attack blueberries to the extent that spraying or dusting is required for control. These are the cranberry fruitworm and the blueberry maggot. The former attacks clusters of green berries rendering them worthless, while the latter attacks only overripe berries. Airplane dusting has given excellent control of both of these pests. Dusts containing rotenone will control either insect, and experimental trials with DDT have given good results with the fruitworm, but not with the maggot.

The potentially most serious

disease of the blueberry in the United States is known as stunt, a virus disease. Infected plants become dwarfed in size; the foliage is smaller, somewhat mottled and cupped, and the berries are small, later in maturing and worthless. This disease has been very serious in a few plantations in North Carolina and New Jersey. It is present in Michigan in a small way. Drastic regulations have been put into effect by the State Department of Agriculture to keep the disease from spreading. Practically every blueberry grower in Michigan is having his plantation inspected each year by state inspectors as a precautionary measure.

A fungus disease of the fruit known as mummy berry has caused considerable loss of fruit in some plantations during recent wet seasons. The disease causes the berries to mummify and drop when about half grown. Sprays and dust treatments have been only partially successful in controlling this disease. Early cultivation, including shallow plowing rather than disking, has given the best results to date.

Production begins in a small way the year after planting. A yield of 1,000 quarts per acre may be obtained the fourth year under good conditions. Plants reach full bearing in from eight to ten years. Average yields in full bearing, under good conditions, should range from 2,000 to 3,000 quarts per acre. The bushes are usually of very long life—some plants being known that are probably 100 years or more of age and in good condition.

Harvesting begins in southern Michigan early in July, in a normal season, and extends until about the middle of September, with peak production reached during the first week in August.

Berries going to the fresh fruit market are packed in pint cups or boxes which are filled rounding full and then covered with a sheet of cellophane on which has been printed the proper grade name. Four grades are packed, Superior, Golden Moon, Columbia and Lake State. Grade is determined by the number of berries required to fill a measuring cup.

About 99 percent of the cultivated blueberry crop in Michigan is sold through the Michigan Blueberry Growers' Association, a cooperative organization. The Michigan Association is part of the Blueberry Cooperative Association which includes blueberry growers in New Jersey and North Carolina, the other two principal blueberry producing states. Marketing methods worked out by the Association have been very efficient and satisfactory.

About 30 percent of the 1945 crop in Michigan was sold to processors. The cultivated blue-

berry makes a very fine canned or quick-frozen product. Increasing amounts will no doubt go to processors as production increases.

The cultivated blueberry has many uses both as fresh fruit or processed. The fresh berries may be used in many ways, including serving with sugar and cream, as an attractive addition to fruit salads, and on ice cream. The canned or quick-frozen berries make delicious pies, muffins and puddings.

There is always a fascination about growing something new, and no doubt many persons will be tempted to grow cultivated blueberries who do not have the proper conditions available. It is important to note that blueberry culture, owing to exacting soil and climatic requirements, is a highly specialized type of fruit growing. Prospective growers should be careful to acquaint themselves with the problems involved before engaging in blueberry culture.

Soft Water on Tap

A shallow well pump operated by electric motor taps 2 large cisterns to give the Alfred Hutcherson family, Holl County, Texas, soft water for household use. One cistern catches water from a shed 40 by 100 feet. The other drains a building that is 24 by 100 feet. The cisterns are churned regularly to keep the water aerated.

Hutcherson says they have had all the soft water needed for laundry, bathroom and dishwashing since the cisterns were constructed.

Electronics in the Service of Food Technology

Condensed from Farm Research

James C. Moyer
Agricultural Experiment Station, Geneva, N. Y.

THE tremendous energy of the atom has been demonstrated in the war with Japan. Each atom altho infinitesimal in size, bears one or many electrical charges called electrons. When these electrons are set in motion, an electronic or electric current is started. Hence, any piece of equipment that generates or utilizes these currents is said to be electronic. An electronic generator with which we are all familiar, the ordinary radio tube, is the result of extensive experimentation. The vacuum tube has undergone improvements until today it is the keystone of our modern radio, telephone, telegraph, and public address systems. Vacuum tubes have made possible radar, equipment for medical diagnosis, and many automatic devices for accurately controlling industrial processes.

It would not be surprising, therefore, if the science of electronics were used on an increasingly larger scale in the preparation and preservation of food. Many examples of the probable application of electronics in the food industry may be cited. One such application may be in the preparation of vegetables for freezing or dehydration where it is necessary to inactivate the enzymes present. If not destroyed, these enzymes will cause off-flavors and losses of vitamins during storage. This enzyme inactivation is normally accomplished by exposing the vegetable to live steam or boiling water, either of which dissolves out the water-soluble vitamins, sugars, and minerals. Moreover, when boiling water or steam is used, the outer portion of the vegetable must be heated longer than is necessary to raise the temperature in the center to the point where the enzymes are inactivated. An ideal heating agency would be one which leached out none of the food constituents and raised temperature uniformly thruout vegetable.

A search for this heating agency brought to mind the diathermy equipment used to produce artificial fevers in the human body. In this case the padded electrodes are placed around a part of the body and the rapidly alternating electric field between the pads causes the temperature of the body to rise even tho the electrodes remain cold. Further investigation revealed that this principle of heating with high frequency electricity was being used with great success to rapidly

Reprinted from Farm Research, Oct. 1, 1945, Geneva, N. Y.

set the glues binding layers of wood in the manufacture of plywood and to heat certain types of plastics before molding. Both the wood and the plastic forms are examples of materials in which heat penetration is very slow. As plywoods and plastics were needed in large quantities during the war, electronic oscillators were developed which reduced the glue-setting time in plywood manufacture from a matter of hours to minutes.

A little over a year ago manufacturers of such electronic heating equipment were approached by the Division of Food Science and Technology of the Experiment Station at Geneva regarding the possibilities of blanching vegetables with high frequency electricity. Preliminary tests soon followed, using electronic electric currents alternating 7 to 10 million times a second. It was soon found that when sufficient current was applied to raise the temperature of the vegetable rapidly, arcing occurred between the electrodes and the vegetable was burned. This experiment was repeated using an electric field alternating 28 to 29 million times a second and the incidence of arcing was somewhat lessened. It appeared then that this danger from burning could be minimized by increasing the frequency of the electric field in which the vegetable was to be blanched.

Thru the courtesy of the R. C. A. Laboratories, Princeton, N. J. an electronic oscillator was installed in the food processing laboratory at Geneva. This oscillator, capable of delivering 750 watts of electrical energy at a frequency of 150 million cycles a second, has been used during the present season for the blanching of a variety of vegetables and fruits and little or no arcing has been encountered.

In the operation of this electronic blanching equipment, there have arisen many problems. Because high frequency electricity heats only the material between the electrodes, some of the heat generated in the vegetable mass is lost to the surrounding air, which allows the outer portion to be less rapidly heated. This heat loss has been successfully overcome by mounting the electrodes in an air oven having a temperature similar to boiling water. Another problem encountered in the electronic blanching of vegetables has been the transfer of the electrical energy from its point of origin in the large vacuum tubes of the oscillator to the electrodes in the air oven. At this high frequency of 150 million cycles, interfering electric fields are set up around the wide bands of copper connecting the oscillator to the electrodes, and unless this opposition is removed, the amount of electrical energy delivered to the

electrodes will be greatly reduced and the blanching time prolonged. Thru the use of loops of copper ribbon which short-circuit the electrodes, the effect of these interfering electric fields is eliminated. Another way of increasing the efficiency of the power transmission lies in raising or lowering the upper electrode.

In the actual experimental blanching, the washed prepared fruits or vegetables are placed in rectangular end-opening cartons with cellophane liners. These cartons are then slid along glass rods or guides so that the carton is centered between the upper and lower electrodes. The temperature of the material thruout the blanching period is read from a thermometer inserted part way into the carton. Because the vegetable or fruit is heated thruout at the same time, the heating periods commonly employed when steam or boiling water is used may not be the proper blanching times, and this possibility has made it necessary to heat similar samples of a vegetable dielectrically to different temperatures for various periods of time. Comparable samples are blanched in steam or boiling water for customary periods of time and serve as references or standards in judging the appearance and flavor after periods in storage at—10° F. As a means of determining the thoroness of the blanching, portions of the samples are used to measure the residual enzyme activity. Vitamin analyses are also made on fresh, blanched, and frozen samples after removal from storage.

In preliminary experiments using shredded cabbage, it was found that when this vegetable was heated electronically, in steam, and in boiling water to the point where the enzyme was destroyed, the losses of vitamin C were 30 to 40 per cent in the steam and water processes and only a negligible 3 per cent during electronic blanching. Altho these results indicate that it is possible to blanch vegetables with little or no loss in vitamin content, the final judgment of the success of electronic blanching must await the examination of appearance and flavor after storage.

While mention has only been made of the use of electronic heat for the blanching of vegetables, it must not be thought that this is the only application electronics has in the processing of foods. Wherever there is a problem of uniform heat penetration or when it is desirable to heat a food without exposure to moisture, there exists a possible successful application of electronic heat. Each application must be considered separately and requires experimentation before a suitable technic is achieved.

Newer Knowledge of Milking

Condensed from Herd Builder

Dr. V. R. Smith

Wisconsin

As cows have been milked since 6,000 B.C., and the chore of milking is usually performed two or more times daily, we had thought there was nothing new to be learned about milking. Now we know that cows can be milked in half the time ordinarily taken. In so doing, more milk is produced, and udder injury is less likely to occur.

Few of us realize the enormous amount of labor that is required in milking. According to the last census, there were 27 million dairy cows two years old and over kept for dairy purposes in the United States. Brodell and Cooper estimate that the labor needed for the milking operation alone is around 6 million hours of labor daily. Let us present it another way — it takes approximately 700,000 men working 8 hours per day the year around to milk these cows. The labor requirement for milking exceeds that of any other agricultural enterprise. Ten percent of the total farm labor is required for milking. Consequently, any improvement in the milking technique that will reduce this time has the possibilities of saving large amounts of labor.

The only source of raw material available to the udder is blood. A remarkable chemical transformation takes place within the udder, because only a few of the constituents of milk exist as such in the blood stream. It has been estimated from analyses of blood before entering and after leaving the udder that about 400 parts of blood have to pass through the udder for every part of milk that is manufactured. With a ratio of one to 400, a cow producing 50 pounds of milk daily would have to pump 20,000 pounds of blood through the udder to provide the necessary raw materials. The udder is capable of selecting certain constituents from the blood and increasing or decreasing their concentration in milk. For example, milk contains fourteen times as much calcium, eight times as much sugar, seven times as much phosphate, five times as much fat, four times as much magnesium, but only one-half as much protein,

Reprinted by permission from the Herd Builder, Oct. 25, 1945, Chicago, Illinois

one-fourth as much chlorine, and one-eighth as much sodium as blood plasma. The udder performs work by increasing or decreasing the concentration of some constituents of milk over that of blood plasma. Some substances of blood appear in the same concentration in milk.

Sometimes when we are in doubt as to the best procedure to follow in doing some job, we can find the answer in nature. Let us consider the process of milking as accomplished by the calf. When a calf starts to nurse a cow, he usually shifts from one teat to the other and butts the cow quite vigorously for the first minute of sucking, for little milk is available, because the cow has not let down her milk. The forward and backward movement of the rough tongue of the calf during the sucking act, and the warm mouth stimulate the cow to let down her milk. We can learn from this, then, that the first essential of better milking is to stimulate the cow beforehand so that a "let down" has taken place before milking begins. Once the milk flow has begun, the calf proceeds to satisfy himself without further delay. This fact gives us a clue to the second essential of good milking — the rapid removal of milk soon after the "let down."

In some of our countries today, calves are tied to the front legs of the cow to get the cow to let down the milk. The cow has associated relief of udder pressure with the sight of the calf and the removal of the milk. Cows form certain associations with the milking act. Some associate the feeding of grain, others the sound of the milking machine, and still others washing and massaging of the cow's teats, depending on how they have been managed. Consequently, we know that cows can be trained to respond to different types of stimuli and associate these with the milking act. Then, the third essential of good milking is to train cows as you would like to have them respond to milking.

A fourth essential of better milking is contented cows. When a cow on pasture or range permits the calf to nurse, the cow is generally located in a quiet spot, contentedly chewing her cud. Cows that are disturbed at milking time do not respond maximally to the milking stimulus.

A cow nursing only one calf or not enough calves to completely empty the udder at each milking will dry off in five or six months or less. Thus, if we want to keep our cows in good production over a period of time, the cows must be milked out completely at each milking. The fifth essential, then, is complete removal of milk at each milking.

How To Cut Feed Costs

Condensed from Missouri Ruralist

MONEY spent for fertilizer is a better investment than money spent for feed. This is what records from farms in Southwest Missouri show. As fertilizer and lime purchases increase the feed bill goes down.

These facts are clearly brought out in a summary of record books kept by borrowers from the Farm Security Administration made by J. O. Martin, district state supervisor with offices in Springfield. The study was made of about 500 books.

In one group of farmers were the tenant - purchase operators whose incomes averaged $3,000 a year or better. This group spent 24 per cent of their gross income for feed. Expense for crops, which includes seed and fertilizer, was 6 per cent of the gross income from the farm.

In another group of borrowers the average income was $1,700. Here the total cost for feed was 33 per cent, 4 per cent for crops.

The extra 2 per cent invested in better practices resulted in the feed expenses being cut from 33 per cent to 24 per cent. On individual farms doing even a better job the feed cost was lowered still more.

In still another group of farms in which the net worth had increased $2,000 or more for the year, only 18 per cent of the income went for feed. 8 per cent for feed-producing expense.

These figures clearly show what a good investment better cropping practices are.

In the second group of farmers mentioned, where feed cost was 33 per cent, three times as much money was spent on feed for livestock as was spent in feeding the family. Also, the farm-operating expense was twice that of the home expense.

A big portion of the income from the farm, records studied by Mr. Martin show, comes from dairying. In the group with incomes of $3,000 milk brought in 30 per cent, beef cattle 16 per cent, poultry 17 per cent, hogs 16 per cent, sheep 4 per cent, crops 7 per cent, and all other sources amounted to 9 per cent.

On the lower - income group milk meant even more—40 per cent of the income. Beef cattle brought in 9 per cent, hogs 11 per cent, sheep 1.5 per cent, poultry 16.3 per cent, crops 3.5 per cent, and all other sources 17.5 per cent.

Records of the milk plant at Neosho indicate that lespedeza has done much to hold up milk production thru the summer, and

Reprinted by permission from the Missouri Ruralist, Aug. 25, 1945, Topeka, Kansas

has thus brought in more income. The peak milk production season has been lengthened about 60 days in the last 10 years.

"A dairyman's success depends on the kind of cows he associates with," says Mr. Martin. Just as bad company may bring downfall to a man, so keeping company with bad cows will bring failure.

Faster Gaining Pigs

Progress in a project at the Ohio Agricultural Experiment Station to determine the merits of crossing inbred lines of hogs was reported by W. L. Robison at the recent annual meeting of the American Society of Animal Production.

In the project, started in 1941, inbred sires were mated (1) to inbred dams of the same lines, (2) to inbred dams of different lines, (3) to outbred dams, and, (4) to dams produced by crossing two other inbred lines. These matings were compared with matings of unrelated, outbred sires and dams. Since all were of the same breed, the pigs were purebreds.

The inbred pigs were lacking in vigor and made costly gains. Although 88 per cent as many live inbreds as outbreds were farrowed per litter, only 44 per cent as many per litter lived to 180 days of age. Also, a higher percentage of them showed defects of various kinds.

Inbred dams mated to inbred sires had relatively small litters. A high percentage of the pigs from these matings lived. They made faster gains and greater gains per unit of feed but, because of numbers, weighed slightly less per litter at six months than the pigs from outbred parents.

Thus far, except for slightly faster gaining pigs and consequently a little heavier weight per litter at six months of age, matings of inbred and of outbred boars to outbred sows have given similar results.

Mating boars of one inbred line to sows produced by crossing two other inbred lines has resulted in more pigs saved per litter, fewer runts and defective pigs and the pigs making faster and more efficient gains than has the mating of unrelated outbred animals. Nine pigs per litter were marketed. These, with no pasture after they were 9 weeks old, averaged 1,842 pounds per litter at 180 days of age, which was 358 pounds more than that of the litters from unrelated, outbred parents. —*Hog Breeder*

Reprinted by permission from the Hog Breeder, Chicago, Illinois

What Affects Vitamin Content of Crops?

Condensed from Better Crops With Plant Food

Clyde Beale
Agricultural Extension Service, Gainesville, Florida

AFTER 18 months of analytical research with vegetables growing in various soil types and under varying fertilization and climatic conditions, Dr. Byron E. Janes of the Florida Agricultural Experiment Station has come to the conclusion that any well-grown vegetable will contain normal amounts of vitamins.

In his research, the Florida horticulturist made analyses for vitamins A and C of cabbage, beans, tomatoes, collards, and broccoli that were grown in eight widely separated locations in Florida, and his results showed that they compared very favorably with those grown in other parts of the country.

He found that vitamin values of vegetables vary with varieties, with some ranking slightly lower than others (variety is not as important as other factors in influencing vitamin content), that they vary with locations and soil types, and with fertilization, temperature, rainfall, and other climatic conditions.

One vegetable's vitamin content may be higher in one location than the same vegetable grown in another, but the vitamin content of other vegetables grown in the two sections would not necessarily be in the same ratio, Dr. Janes discovered. He explained this point by showing that the location which produced cabbage of the highest vitamin C content produced beans of the lowest C content.

Temperature, light, rainfall, and other climatic conditions affect the vitamin content of vegetables, and as these vary each year, the vitamin contents of the vegetables also vary.

Dr. Janes found that the effect of fertilizer on vitamin content of vegetables is not nearly as great as the effect of location. The C content of cabbage and broccoli that were heavily fertilized was slightly lower than that of the same vegetables that received less fertilizer; the C content of collards was much lower, and the A content of collards and broccoli was raised by heavy fertilization.

His research showed that fertilizer does not materially affect the vitamin content of an individual vegetable, but it does materially increase the vitamin value of the whole crop in that it increases the yield.

Reprinted by permission from Better Crops With Plant Food, Washington, D. C.

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

A Living from Bees — By Frank C. Pellett, Field Editor of American Bee Journal. Orange Judd Publishing Co., Inc. $2.00.

America's Garden Book — By Louise Bush-Brown and James Bush-Brown. Charles Scribner's Sons. $3.50.

An Agricultural Testament—By Sir Albert Howard, C.I.E., M.A., former Director, Institute of Plant Industry, Indore. Oxford Univ. Press. $3.50.

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean of the School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $2.85.

Beef Cattle — By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Sons, Inc. $4.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers. $2.00.

Breeds of Livestock in America—By Henry W. Vaughan, formerly Prof. of Animal Husbandry, Iowa State College. College Book Co. $3.75.

Dairy Cattle Feeding and Management—3rd Edition—By H. O. Henderson, Prof. of Dairy Husbandry, W. Va. Univ., Carl W. Larson and Fred S. Putney. John Wiley & Sons, Inc. $4.00

Dairy Science—By W. E. Petersen. Ph.D., Assoc. Prof. Dairy Husbandry, Univ. of Minn. By R. W. Gregory. J. B. Lippincott Co . $4.00.

Diseases and Parasites of Poultry — By Edgar Hugh Barger, D.V.M., Berkeley, Calif., and L. E. Card, Ph.D., Prof. of Poultry Husbandry, Univ. of Illinois. Lea & Febiger. 3rd Edition (1943). $3.75.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.00.

Farm Management and Marketing — By V. B. Hart, M. C. Bond, L. C. Cunningham, all of N. Y. State College of Agriculture, Cornell University. Publishers: John Wiley & Sons, Inc. $2.75.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Production—By Walter H. Peters, Chief, Div. of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $3.50.

Livestock Judging Handbook — By Julius E. Nordby and W. Malcolm Beeson, Ph.D., Asst. Professors Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

Natural Principles of Land Use—By Edward H. Graham,, Chief of the Biology Division of the Soil Conservation Service. Oxford University Press. 275 pages. $3.50.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry, Mo. State Univ. J. B. Lippincott Co. $5.00.

Practical Farming for the South — By Benjamin F. Bullock, now Prof. Rural Education, Atlanta Univ. Univ. of North Carolina Press. $2.50

Profitable Poultry Keeping—By H. Clyde Knandel, Head, Dept. Poultry Husb., Penn State College. Orange Judd Publishing Co., Inc. $3.00.

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $3.75.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue Univ. The Interstate Printers & Publishers. $1.80.

The American Land—Its History and Its Uses — By William R. Van Dersal, biologist in the U. S. D. A. Oxford University Press. $3.75.

Successful Poultry Management—By Morley A. Jull, Professor and Head of Poultry Dept., Univ. of Maryland. McGraw-Hill Book Co., Inc. $3.80.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.00.

Soil Conservation — By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Dept. of Agric. McGraw-Hill Book Co., Inc. $6.00.

The Farm Primer—By Walter Magnes Teller, formerly with the Farm Security Administration, U. S. D. A. David McKay Co. $2.50.

For the convenience of our readers, books listed may be purchased through this Department. Address Farmers Digest, Ambler, Pa.

BOOKS OF INTEREST

PLEASANT VALLEY—By Louis Bromfield, farmer soil conservationist, author.

This appealing and delightful book is written for everyone—city-dweller or country man. It is an engaging account of the author's experiences as a farmer in his native Ohio, telling the story of the land and people who are closest to him.

Publishers: Harper & Brothers. 302 pages; 49 drawings by Kate Lorl $3.00.

PALESTINE—LAND OF PROMISE—By Walter Clay Lowdermilk, soil conversationist, forestry engineer, assistant chief of the Soil Conservation Service.

Out of Palestine there is emerging a "new realization of man's moral obligation to the good earth which nourishes those who give it loving care." In the book, **"Palestine—Land of Promise,"** the author presents the achievements of Jewish settlers in that eroded, sterile land where through the application of modern methods of irrigation, drainage, fertilization and reforestation amazing changes are being wrought.

Publishers: Harper & Brothers. 236 pages. $2.50.

FARMERS OF THE WORLD—The Development of Agricultural Extension, edited by Edmund deS. Brunner, Irwin T. Sanders, and Douglas Ensminger.

With war-torn countries beginning the rehabilitation of their rural areas, this book is particularly important, mobilizing the findings of science in this field and showing the way to present them to farm people with sympathetic interpretation and assistance in their application.

Publishers: Columbia University Press. 208 pages. $2.50

PAY DIRT—Farming and gardening with Composts, by J. I. Rodale.

This book describes the revolution in agriculture in many countries of the world and emphasizes the close relation between a fertile soil and human health. It challenges the chemicalized farming of past decades and its results in erosion, soil exhaustion, plant and animal disease, and the malnutrition of people.

Publishers: The Devin-Adair Co. 242 pages. $3.00.

INDEX

Beef Cattle

The Story of Meat ..... Feb., 1945
Need of Efficiency ..... Mar., 1945
Dark Beef ..... April, 1945
What is Type? ..... April, 1945
Breeding of Charollais Cattle ..... April, 1945
Bang's Disease Control ..... April, 1945
Grow Your Own Feed ..... May, 1945
Rodeo—A Little of Its History ..... June, 1945
Gestation Periods of Five Breeds of Livestock ..... June, 1945
Phenothiazine Boosts Steer Gains .. June, 1945
This Problem of Inheritance ..... July, 1945
Fitting for Show and Sale ..... Oct., 1945
Marketing Your Purebred Livestock Oct., 1945
More Calves—Fewer Bulls ..... Oct., 1945
Tomorrow's Beefstake ..... Nov., 1945
Producing Twins at Will ..... Dec., 1945
Soybean Oil Meal for Beef Cattle ... Jan., 1946
Finishing Steers in the Feedlot ..... Jan., 1946
Four Points to Watch ..... Jan., 1946

Conservation

From Poverty Grass to Alfalfa ..... Jan., 1945
Didn't Plow Sod Land ..... Jan., 1945
Sods for Soil Improvement ..... Feb., 1945
Terracing for Fun ..... Feb., 1945
Reed Canary Grass in Gully Control . Feb., 1945
Equipment Adapted to Contour Farming, Feb., 1945
Your Land Belongs to Tomorrow ... Mar., 1945
Take Care of the Range and the Profits Take Care of Themselves ..... April, 1945
Legumes Harness Bacteria ..... Nov., 1945
What Ails Your Soil ..... Nov., 1945
Mulch Farming Checks Erosion .... Jan., 1946

Crops

Sprouted Soybeans Save Feed ..... Feb., 1945
Ladino Clover ..... Mar., 1945
Giant Blue Panic Grass ..... Mar., 1945
Blue Lupine, a Valuable Legume ... Mar., 1945
Alfalfa $3 a Ton ..... May, 1945
Save Labor in Corn Growing ..... May, 1945
An Easier Way to Harvest Hay ... June, 1945
Vacuum Cleaning Clover Seed ..... June, 1945
Potato Seed Determines Production Possibilities ..... June, 1945
The Queen of All Fibers—Ramie ... July, 1945
New Wealth from Seed ..... July, 1945
Water Cress ..... July, 1945
Blue Lupine Makes Good ..... Oct., 1945
You Can't Go Wrong with Wong ... Oct., 1945
Thin Stands of Corn Prduces Bigger Ears, Nov., 1945
Alfalfa—the Aristocrat ..... Dec., 1945
Less Cob—More Corn ..... Jan., 1946
Let's Examine Crop Rotations ..... Jan., 1946

Dairy Cattle

A Leak in Dairy Farm Profits ..... June, 1945
Gestation Periods of Five Breeds of Cattle, June, 1945
The Selection of Dairy Sires ..... July, 1945
Thyroprotein Influence on Milk Production, July, 1945
Time Studies in the Dairy Barn .... July, 1945
More Attention to Breeding Efficiency Oct., 1945
Extra Ton of Milk Per Cow Each Year, Oct., 1945
Mastitis Can Be Controlled ..... Oct., 1945
So You Expect Your Cows To Make Money, Oct., 1945
Spaying Cows Adds Milk, Tests Reveal, Oct., 1945
New Method Keeps Cream Fresh .... Oct., 1945
Dynamic Kernels ..... Nov., 1945
Inside the Cow's Udder ..... Nov., 1945
Corn Silage Makes Valuable Cow Feed, Nov., 1945
Mammary Gland Development in Calves, Nov., 1945
Ways to Improve Dairy Efficiency . Nov., 1945
Variations in the Fat Test of Milk . Nov., 1945
Dairy Cattle Development in the Future, Dec., 1945
Acidophilus Milk for Calf Scours ... Dec., 1945
Speedy Milker Washing ..... Jan., 1946
No Feet—No Horse . . . No Udder—No Cow, Jan., 1946

Farm Machinery

Electricity Unloads the Corn Wagon . Nov., 1944
Care of Milking Machines ..... Feb., 1945
A "Sure Enough" Push Button Barn Cleaner, Mar., 1945
New Land Clearing Machine ..... Mar., 1945
Machine Co-op ..... April, 1945
Protects Metal from Rust ..... April, 1945
Tractors Cut Corn Costs ..... May, 1945
Lubrication Pays ..... July, 1945
What's New in Farm Machinery .. July, 1945
Indiana "Grinds" Corn Borers .... Nov., 1945
Safeguarding Power Farm Machinery Dec., 1945

Fruit

Speed Sprayer Is Labor Saver ..... Dec., 1944
Reducing Apple Drop with Harvest Sprays, Jan., 1945
Controlling Field Mice in Orchards .. Jan., 1945
New Varieties of Small Fruits ..... Feb., 1945
Methods of Speeding Apple Picking . Feb., 1945
Thinning of Peaches ..... May, 1945
Soil Management in Young Orchards June, 1945
Sulfa Drug Immunizes Peach Trees . June, 1945
Orchard and Garden Mulches ..... Oct., 1945
Balanced Sods in the Apple Orchard Dec., 1945
Nitrogen for Fruit Production ..... Dec., 1945

Fertilizers

Fertilizing for Big Yields ..... Dec., 1944
Danger in Improper Use of Fertilizers, Jan., 1945
Soil Fertility, Food Source ..... Feb., 1945
Humus, Working Partner of Plant Food, Feb., 1945
Cornstalks to the Rescue ..... Mar., 1945
Fertilizer Makes Farm Acre Larger . Mar., 1945
How Long Do Effects from Fertilizers Last, April, 1945
Farm Manure as a Fertilizer ..... April, 1945
Double-Quick Fertility ..... May, 1945
Balance in Plant Nutrition ..... May, 1945
Know Your Phosphates ..... May, 1945
Liming the Land ..... May, 1945
Maintaining Productivity ..... June, 1945

INDEX

He Rebuilds Georgia's Soil ..... June, 1945
Good and Bad Health is Traced Back to Soils, June, 1945
Plants Vary in Mineral Composition . July, 1945
Nitrogen is a Growth Element ..... Oct., 1945
Organic Matter—Cash for Soil Bank Oct., 1945
Fall Topdressing ..... Nov., 1945
When Your Land Needs Phosphorus Dec., 1945
Nitrogen to Increase Corn ..... Jan., 1946
Soil Fertility and Trace Elements ... Jan., 1946
Leaf Analyses Show Needs ..... Jan., 1946

Hay

Forced Ventilation Method of Curing Hay, May, 1944
Beating a Hay Shortage ..... June, 1944
Mow Curing of Hay ..... June, 1944
Curing Hay on Tripods ..... Aug.-Sept., 1944
Hubam Clover a Four-Way Crop ... Dec., 1944
Sweet Sudan in the Pasture Program May, 1945
Fertility for Grasslands ..... Dec., 1945
Hay Drying Bins for Small Farms .. Jan., 1946

Hogs

Tilt the House, Save More Pigs .... May, 1945
Grow Your Own Feeds ..... May, 1945
Anemia in Hogs Can Be Checked .. June, 1945
Methods of a Master Producer ..... July, 1945
Two Point Pork Methods ..... Oct., 1945
38 Tons of Pork from 35 Sows! ... Nov., 1945
Another New Breed of Hogs ..... Dec., 1945
Growing Market Hogs Without Animal Protein ..... Dec., 1945
Hog Feeding Facts ..... Dec., 1945
Early Farrowed Pigs Are Healthier . Dec., 1945
Care of the Herd Boar ..... Jan., 1946

Horses

"Alkali Reserve" and Staying Power in Horses ..... Nov., 1944
Columbus Took a Chance ..... Dec., 1944
What Kind of Horses Do We Need? . Feb., 1945
The Quarter Horse ..... Nov., 1945
Feeding Work Stock in Winter .... Dec., 1945

Pastures

Cattle Like "Suiter's Grass" ..... Feb., 1945
Good Pasture Management ..... Feb., 1945
Pasture with a Punch ..... Mar., 1945
To Expand the Roughage Supply .. April, 1945
Sweet Sudan in the Pasture Program May, 1945
Trends in Pasture Improving Methods, June, 1945
New Pasture Grass, Ree Wheatgrass . July, 1945
Land Gets Grass Cure ..... Oct., 1945
Pasture Farmer Champion ..... Oct., 1945
What's a Good Pasture Program? .. Nov., 1945
Eight Months of Pasture ..... Jan., 1946

Poultry

Steps Take Time ..... May, 1945
Raising Geese at Ark Farm ..... May, 1945
Revolutionary Feeding Discovery .. June, 1945
Preventing Poultry Diseases ..... June, 1945
Vaccinate for Protection ..... June, 1945
Stop That "In-Between" Mortality . July, 1945
Labor Short-Cuts for Poultry on Pasture, July, 1945
Growing Profitable Pullets ..... July, 1945
How Much Should a Pullet Cost? ... July, 1945
Broiler Profits Almost Assured ..... Oct., 1945
Turkeys Fed Grass Clippings Gain Weight, Oct., 1945
How Champion Layers Are Managed Oct., 1945
Laying Flock Management ..... Nov., 1945
Jersey Buff Turkeys ..... Nov., 1945
When and Why They Die ..... Nov., 1945
Winter Ranged Broilers ..... Nov., 1945
Summer Shelter—Winter Laying House, Dec., 1945
Better Balance Gets Results ..... Dec., 1945
Suits from Chicken Feathers ..... Jan., 1946
Hunt Broad-Breasted Chicken ..... Jan., 1946
Broiler Qualities ..... Jan., 1946
To Get More Winter Eggs ..... Jan., 1946

Sheep

Some Facts About Feeding ..... Jan., 1945
Raising Sheep on Poor Feed ..... Feb., 1945
Pheno-Thiazine Salt Mixture ..... April, 1945
Good Sheep Don't Die in Debt ..... April, 1945
The Montadale—A New Breed ..... May, 1945
Lamb Pastures ..... June, 1945
Preventing and Curing Stiff-Lamb Disease, July, 1945
Black Sheep ..... July, 1945
How a Sheep Herder Ranges His Sheep, Nov., 1945

Forestry

White Pine Protected from Disease . July, 1945
Chemistry on a Sawdust Trail ..... Nov., 1945
Does Farm Forestry Pay? ..... June, 1945

Weeds

Nebraska's War on Weeds ..... July, 1945
Beat the Weeds for More Bushels, Aug.-Sept., 1945
"2-4-D," the New Weed Killer ..... Mar., 1945
Stop, Look and Question! ..... Mar., 1945
Insect Control of Weeds ..... Nov., 1945
Modern Chemistry in Weed Control . Dec., 1945

Vegetables

Fertilizing for Big Yields ..... Dec., 1945
Air Transport for Certain Crops ... May, 1945
"Any Fool Can Grow Tomatoes" ... May, 1945
Yam Drying Comes of Age ..... May, 1945
Growing Trellis Tomatoes ..... June, 1945
Potato Seed Determines Production Possibilities ..... June, 1945
Tomato Pollenization ..... July, 1945
Know Your Soil for Tomatoes ..... Jan., 1945
Sunshine for Sale ..... Jan., 1945

Miscellaneous

Stopping Cistern and Basement Leaks, Oct., 1945
Protein Hunger ..... Oct., 1945
A New Principle in Weed Control .. Oct., 1945
The Eye and Hand in Judging .... Nov., 1945
What is Happening to the Water in Your Well? ..... Nov., 1945
A Layout for Labor Saving ..... Nov., 1945
Dangers of the Compost Pile ..... Nov., 1945
Blueprints for a Better County .... Nov., 1945
Packaged Fuel ..... Nov., 1945
Washes Separator by Quick Method Nov., 1945
Foaming Beans ..... Dec., 1945
Protecting Wood from Within ..... Dec., 1945
Factors in the Choice of Fence Posts . Dec., 1945
New Ways of Living ..... Jan., 1945
Soil Fertility and Farm Security .... Jan., 1945
Responsibilities of Co-operatives ... Jan., 1945
Father and Son Partnerships ..... Jan., 1945
Built-in Fire Prevention on Farm .. Jan., 1945

THE PLANNING PAMPHLET SERIES

These pamphlets are published by the National Planning Association as a series of special reports on problems of public affairs. Below are listed the issues which we feel may be of interest to farmers because of their direct or indirect bearing on the Nation's agriculture in the Post-War period.

Single copies of the pamphlets may be obtained for 25c apiece and discounts are allowed on quantity orders. Address: NATIONAL PLANNING ASSOCIATION, 800 21st Street, N.W., Washington 6, D. C.

Titles available are:

No. 2—War and Our Latin American Trade Policy
No. 8—Guides for Post-War Planning
No. 9—Britain's Trade in the Post-War World
No. 11—For a Better Post-War Agriculture
No. 15—International Development Loans
No. 16—Regional Resource Development
No. 17—Relief for Europe
No. 18—Economic Pattern of World Population
No. 21—The Outlook for Domestic Air Transport
No. 22—The Outlook for the Railroad Industry
No. 23—Public Thinking on Post-War Problems
Nos. 25-26—World Needs for U. S. Food and Fiber (50c)
No. 28—Farm People and the Land After the War
No. 29—Food for Europe After Victory
Nos. 30-31—UNRRA: Gateway to Recovery (50c)
No. 32—The Outlook for Synthetic Rubber
No. 33—Joint Statement on Social Security
No. 34—Clothing and Shelter for European Relief
No. 36—Europe's Uprooted People: Relocation of Displaced Population
Nos. 37-38—America's New Opportunities in World Trade (50c)
No. 40—China's Relief Needs
No. 42—Fertilizers in the Postwar National Economy
No. 46—A Food and Nutrition Program for the Nation
No. 47—Farms for Veterans

The main objective of the National Planning Association is to study and recommend for consideration plans for coping with the future, always bearing in mind that the guiding principle is the achievement by democratic means of the highest possible material and cultural standard of living for the whole people.

Membership in the NPA is $10 a year which includes both the monthly PUBLIC POLICY DIGEST (a report on significant activities of government and private agencies), and also the PLANNING PAMPHLET SERIES.

ARE YOU KEEPING UP—

Keep up with the latest developments in your field? Here's a group of magazines that specialize in a particular subject! You'll be interested in at least one of these magazines . . . and you have the assurance that the articles are written by people who know. Send in your subscriptions today!

Farming

	Per Year
Farmer's Digest, monthly	$2.00
The Country Book, quarterly	1.00
Market (Truck) Growers Journal	1.00

Horses

Rider & Driver, monthly, horses for sport and pleasure	2.50
The Horse, bi-monthly	5.00
Thoroughbred (Horse) Record, weekly	5.00
Spokesman and Harness World, monthly	1.00

Bee Magazines

Gleanings in Bee Culture, m.	1.00
Beekeeper's Item	1.00
American Bee Journal	1.50

Livestock

Berkshire (Hog) News, monthly	1.00
Chester White World, m.	1.00
American Cattle Producer	1.00
Southeastern Cattleman	1.00
Coastal Cattleman, monthly	1.00
Pacific Stockman, monthly	1.00
The Sheepman	1.00
Arizona Stockman, monthly	1.50
Plantation Stockman, monthly	2.00

Pigeons

American Pigeon Journal, squab-fancy	1.50
Pigeon News, fancy only	1.50

Poultry

Poultry Billboard, m.	1.00
Cackle & Crow, The Poultry-paper	1.00
Pacific Poultryman	.50

Rabbits

The Rabbit Raiser, m.	1.00
Calif. Rabbits Mag., m.	1.00
Calif. Rabbit News, m.	1.00
Intern. Comm. Rabbit Journal (Angoras only), m.	1.00
Small Stock (rabbits, cavies exclusively)	1.00
American Rabbit Journal	1.00

Fruit

Better Fruit, monthly	1.00
Eastern Fruit Grower	1.00

Dairying

Amer. Dairy Goat News, m.	1.00
Dairy Farmers Digest	1.00

Other Specialties

Co-operative Digest, m.	2.00
The Soybean Digest	1.50
New Agriculture (sugar beets only)	2.00
Modern Game Breeding, m., pheasant, wild waterfowl, etc.	3.00
Game Breeder & Sportsman, m	2.50
Black Fox Magazine, monthly, fox, mink	3.00
Canary Journal, monthly	2.00
Canary World, m.	1.25
Tailwagger, m., dogs	2.50
World-wide (Stamp) Swapper, 3 yrs.	1.00
Embers, verse, liter., b.m.	2.00

All magazines are monthlies except where otherwise noted; prices are for one full year. Satisfaction guaranteed. All orders are handled promptly and acknowledged. Rush your subscriptions today. Remit in any manner convenient to you.

Magazine Mart

Dept. FD, P. O. Box 1288, Plant City, Fla.

Sample Copies at Single Copy Prices

Send for FREE Catalog